Sun StorEdge™ 3000 Family Configuration Service 1.3 User's Guide

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Sun StorEdge 3310 SCSI Array

Sun StorEdge 3510 FC Array

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Preface

This user's guide explains how to install and use Sun StorEdge™ Configuration Service to configure, monitor, and manage the Sun StorEdge 3510 FC and 3310 SCSI arrays.

Unless otherwise specified, the Sun StorEdge 3510 FC array and 3310 SCSI array are hereafter referred to as the *array*. This guide also references Sun StorEdge 3000 Family Diagnostic Reporter, a companion utility of Sun StorEdge Configuration Service for sending and receiving system messages from the hosts and arrays. For details about installing and using Sun StorEdge Diagnostic Reporter, refer to the *Sun StorEdge 3000 Family Diagnostic Reporter User's Guide*.

This guide is written for experienced system administrators who are already familiar with Sun™ hardware and software products.

How This Book Is Organized

This book covers the following topics:

Chapter 1 introduces Sun StorEdge Configuration Service features.

Chapter 2 lists steps to follow to ensure that the array has been configured properly before you install and use Sun StorEdge Configuration Service.

Chapter 3 provides system requirements and installation procedures for Sun StorEdge Configuration Service Consoles and Agents on systems running the Solaris™ operating environment.

Chapter 4 provides system requirements and installation procedures for Sun StorEdge Configuration Service Consoles and Agents on Windows NT/2000 systems.

Chapter 5 provides system requirements and installation procedures for Sun StorEdge Configuration Service Consoles and Agents on systems running the Linux operating environment.

Chapter 6 contains procedures for setting up Sun StorEdge Configuration Service.

Chapter 7 provides instructions for configuring the array.

Chapter 8 explains how to create a LUN filter to maintain large Fibre Channel networks that share common storage (Fibre Channel only).

Chapter 9 explains how to monitor the array.

Chapter 10 explains how to maintain the integrity of the array.

Chapter 11 explains how to change or add to the current array configuration.

Appendix A provides basic RAID information.

Appendix B explains how to monitor and download firmware to a standalone JBOD (SCSI Only).

Appendix C provides information about setting up a cluster configuration (SCSI Only).

Appendix D explains how to determine the host worldwide name (WWN) on systems running the Solaris operating environment and Windows NT (Fibre Channel Only).

Appendix E explains how to set up full event monitoring and email notification capabilities.

Appendix F provides troubleshooting suggestions for a list of symptoms.

Appendix G contains a list of Sun StorEdge Configuration Service error codes and messages.

The Glossary provides RAID terminology and definitions used throughout the product documentation.

Using UNIX Commands

This document might not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or more of the following for this information:

- *Solaris Handbook for Sun Peripherals*
- AnswerBook2™ online documentation for the Solaris operating environment.
- Other software documentation that you received with your system

Typographic Conventions

Typeface*	Meaning	Examples
`AaBbCc123`	The names of commands, files, and directories; on-screen computer output	Edit your `.login` file. Use `ls -a` to list all files. `% You have mail.`
`AaBbCc123`	What you type, when contrasted with on-screen computer output	`% su` `Password:`
AaBbCc123	Book titles, new words or terms, words to be emphasized. Replace command-line variables with real names or values.	Read Chapter 6 in the *User's Guide.* These are called *class* options. You *must* be superuser to do this. To delete a file, type `rm` *filename.*

* The settings on your browser might differ from these settings.

Shell Prompts

Shell	Prompt
C shell	*machine-name*%
C shell superuser	*machine-name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Related Documentation

Product	Title	Part Number
Sun StorEdge 3310 SCSI array only	*Sun StorEdge 3310 SCSI Array Release Notes*	816-7292
	Sun StorEdge 3000 Family Best Practices Manual	816-7293
	Sun StorEdge 3000 Family RAID Firmware 3.25 User's Guide	816-7296
	Sun StorEdge 3000 Family Installation, Operation, and Service Manual	816-7290
Sun StorEdge 3510 FC array only	*Sun StorEdge 3510 FC Array Release Notes*	816-7301
	Sun StorEdge 3000 Family Best Practices Manual	816-7325
	Sun StorEdge 3000 Family RAID Firmware 3.27 User's Guide	816-7934
	Sun StorEdge 3000 Family Installation, Operation, and Service Manual	816-7300
Both the Sun StorEdge 3310 SCSI and the Sun StorEdge 3510 FC arrays	*Sun StorEdge 3000 Family Diagnostic Reporter 1.3 User's Guide*	817-3338
	Sun StorEdge 3000 Family Rack Installation Guide	816-7320
	Sun StorEdge 3000 Family FRU Installation Guide	816-7326
	Sun StorEdge 3000 Family Safety, Regulatory, and Compliance Manual	816-7930

Contacting Sun Technical Support

For late-breaking news and troubleshooting tips, review the release notes for your array located in the appropriate directory:

`www.sun.com/products-n-solutions/hardware/docs/Network_Storage_Solutions/Workgroup/`

If you have technical questions about this product that are not answered in the documentation, go to:

`http://www.sun.com/service/contacting`

To initiate or check on a USA-only service request, contact Sun support at:

800-USA4SUN

To obtain international technical support, contact the sales office of each country at:

`www.sun.com/service/contacting/sales.html`

Accessing Sun Documentation

All Sun StorEdge 3000 family documentation is available online in both PDF and HTML format at the following location:

`http://www.sun.com/products-n-solutions/hardware/docs/Network_Storage_Solutions/Workgroup/`

You can view, print, or purchase a broad selection of Sun documentation at:

`http://www.sun.com/documentation`

You can order printed copies of manuals for the Sun StorEdge 3000 family at:

`http://corppub.iuniverse.com/marketplace/sun`

508 Accessibility Features

The Sun StorEdge documentation is available in 508-compliant HTML files that can be used with assistive technology programs for visually impaired personnel. These files are provided on the Documentation CD for your product as well as on the websites identified in the previous “Accessing Sun Documentation” section. Additionally, the software and firmware applications provide keyboard navigation and shortcuts, which are documented in the user's guides.

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Please include the title and part number of your document with your feedback: *Sun StorEdge 3000 Family Configuration Service 1.3 User’s Guide*, part number 817-3337-10.

CHAPTER 1

Introduction

This section provides a brief overview of Sun StorEdge Configuration Service features.

Note – For brevity, Sun StorEdge Configuration Service is sometimes referred to as *the program* throughout this guide.

Sun StorEdge Configuration Service is a sophisticated program based on the Java™ programming language, which brings together storage configuration, resource allocation, maintenance, and monitoring tools into one application for centralized administration of the array.

From a single console located on a network, system administrators can initialize network storage, change configurations, monitor status, and schedule routine maintenance through an intuitive graphical user interface (GUI).

Administrators can also dynamically allocate, reallocate, or expand capacity as storage requirements continually change with evolving network-wide storage demands.

In the event of a change in status, the program sends alerts by console display, email, or alphanumeric pager. It can also send alerts to any Simple Network Management Protocol (SNMP) enterprise manager, for example HP OpenView.

Sun StorEdge Configuration Service consists of two components:

- *Sun StorEdge Configuration Service Agent* – Solaris 8 and Solaris 9 operating environments, Windows NT and Windows 2000, and Sun™ Linux 5.0 and Red Hat Linux 7.2 and 7.3 operating environments.

  The agent monitors attached disk storage devices and reports their status to the console about these devices. The agent software needs to be installed on each individual server in the network that is part of Sun StorEdge Configuration Service. The installation can be done remotely from a single workstation on the network.

- *Sun StorEdge Configuration Service Console* – Solaris 8 and Solaris 9 operating environments, Windows NT and Windows 2000, and Sun Linux 5.0 and Red Hat Linux 7.2 and 7.3 operating environments.

  The console contains the GUI portion of Sun StorEdge Configuration Service and displays the information reported by the agents. The console also provides remote configuration and management of the devices from a single workstation. The console needs to be installed on a computer that manages the servers on your network.

CHAPTER 2

Before You Begin

This chapter contains important information you need to be aware of before you install and use Sun StorEdge Configuration Service. Topics covered in this chapter include:

- "Example Screens" on page 3
- "Solaris Operating Environment" on page 3
- "Windows NT/2000 Operating System" on page 4
- "Superuser/Administrator Privileges" on page 4

Example Screens

Many example screens are provided throughout this guide to demonstrate the program. These screens might identify either the Sun StorEdge 3310 array or the Sun StorEdge 3510 array in the output. Unless specifically noted that a function, and therefore its example screen, is for the Sun StorEdge 3510 FC array only, either array applies.

Solaris Operating Environment

Before you install Sun StorEdge Configuration Service on systems running the Solaris operating environment:

- Make sure the host server that the Sun StorEdge Configuration Service Agent is installed on is connected to a channel with a primary ID assigned. Refer to the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array for controller defaults and initial configuration information.

- For the Sun StorEdge 3310 SCSI array, make sure the operating environment can recognize multiple LUNs under the same ID. You might need to modify `/kernel/drv/sd.conf` for additional host LUN assignments. For information on how to modify this file, refer to the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your SCSI array. If you make any changes to the `sd.conf` file, you need to reboot the workstation for the modifications to take effect.

Windows NT/2000 Operating System

Before you install Sun StorEdge Configuration Service on a Microsoft Windows operating system:

- Make sure the host server that the Sun StorEdge Configuration Service Agent is installed on is connected to a channel with a primary ID assigned. Refer to the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array for controller defaults and initial configuration information.
- Make sure the server is connected to the operating system and the server recognizes the storage.

Superuser/Administrator Privileges

You must have superuser/administrator privileges to install Sun StorEdge Configuration Service and run the console.

CHAPTER 3

Installing Sun StorEdge Configuration Service on Systems Running the Solaris Operating Environment

This chapter provides procedures for installing Sun StorEdge Configuration Service Consoles and Agents on systems running the Solaris operating environment. Topics covered in this chapter are as follows:

- "System Requirements" on page 5
- "Prior to Installing Sun StorEdge Configuration Service" on page 6
- "Installing Software" on page 7
- "Users and Passwords" on page 14
- "Uninstalling Sun StorEdge Configuration Service" on page 16
- "Restoring a Configuration" on page 17

System Requirements

- Netscape™ 4.0 or later – To view online help.
- TCP/IP compliant network interface for the console – Each console must have a TCP/IP compliant network interface (such as an Ethernet or Token Ring network card, or a serial line with a modem).
- The console is best viewed with a monitor resolution of 1024 x 768 pixels with 256 colors. For other console requirements, see the following table.

TABLE 3-1 Console System Requirements

Solaris Operating Environment Version	Memory	Disk Space
Solaris 8 and Solaris 9 with Sun recommended patches. (For a list of Sun recommended patches, refer to the release notes for your array.)	64 MB recommended	16 MB free disk space minimum

- TCP/IP compliant network interface for the agent – Each agent must have a TCP/IP capable network card interface and driver set (included with the operating environment). For other agent requirements, see the following table.

TABLE 3-2 Agent System Requirements

Solaris Operating Environment Version	Memory	Disk Space
Solaris 8 and Solaris 9	128 MB minimum	1 MB free disk space minimum

Prior to Installing Sun StorEdge Configuration Service

Note the following required procedures and additional options prior to installing the program and its related software components.

- Be sure to read the release notes for your array**.**
- Install operating environment updates. To use Sun StorEdge Configuration Service on systems running the Solaris operating environment, you need to install the most current Sun recommended operating environment patches and Java patches for Solaris 8 and Solaris 9 operating environments. For a list of Sun recommended patches, refer to the release notes for your array.

- If your operating environment contains an enterprise management console, you can optionally configure agents to send trapped events to the console using the SNMP service. The SNMP service is included with the operating environment and is installed after installing the TCP/IP protocol stack.
- If you want the servers on your network to send SNMP traps to the enterprise management console, see "Email and SNMP" on page 229.
- *Optional*. To install and use Sun StorEdge Diagnostic Reporter, a companion utility of Sun StorEdge Configuration Service that reports your storage system events to specified email addresses, refer to the *Sun StorEdge 3000 Family Diagnostic Reporter User's Guide*.
- *Optional*. To use multipathing, Sun StorEdge Traffic Manager software for the Solaris operating environment is required (included in the Sun StorEdge SAN Foundation software). Refer to the "Other Supported Software" section in the release notes for your array for more information.

Note – You must be a superuser to install Sun StorEdge Configuration Service and run the console.

Installing Software

Sun StorEdge Configuration Service includes the following components:

- Sun StorEdge Configuration Service Agent.
- Sun StorEdge Configuration Service Console.
- Diagnostic Reporter (optional utility) – For installation and operation information, refer to the *Sun StorEdge 3000 Family Diagnostic Reporter User's Guide*.
- Command-Line Interface (CLI) – For installation information, refer to the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array.

Installation Packages

The Sun StorEdge Configuration Service Agent and Console installation packages are contained on the Sun StorEdge 3000 Family Professional Storage Manager CD. The program supports four languages. The following table specifies which files are required for each language.

Note – Each language requires the English installation package for the console and the agent.

TABLE 3-3 Required Sun StorEdge Configuration Service Installation Packages for the Solaris Operating Environment

	English	French	Japanese	Simplified Chinese
Agent	SUNWscsd	SUNWscsd SUNWfscsd	SUNWscsd SUNWjscsd	SUNWscsd SUNWcscsd
Console	SUNWscsu	SUNWscsu SUNWfscsu	SUNWscsu SUNWjscsu	SUNWscsu SUNWcscsu

▼ To Install the Agent and Console

Install the agent on each of the servers that is part of Sun StorEdge Configuration Service. Install the console on the computer or workstation you plan to use for managing and maintaining the storage system.

The console can be installed on the server or on any client system. The agent must be installed on the server to which the storage is attached.

Complete the following steps to install the agent, console, or both. You must install at least one agent and one console for the program to run.

Note – Make sure Java runtime environment 1.2 software or later is installed on the computer or workstation on which you are installing Sun StorEdge Configuration Service.

Note – You must uninstall Sun StorEdge Configuration Service when upgrading the console or agent. For details on uninstalling, see “Uninstalling Sun StorEdge Configuration Service” on page 16.

Note – If you are adding French, Japanese, or Simplified Chinese language support, you must install the English version of the program *first*.

1. **Insert the Sun StorEdge 3000 Family Professional Storage Manager CD and type**

```
# cd /cdrom/cdrom0/product/solaris
```

2. **Install the packages in one of the following ways:**

   a. **To install the agent only (English), type**

```
# pkgadd -d SUNWscsd
```

   b. **To add French, Japanese, or Simplified Chinese language support, type**

```
# pkgadd -d SUNWxscsd
```

   where *x* is c, j, or f, depending on what language you are installing. See "Required Sun StorEdge Configuration Service Installation Packages for the Solaris Operating Environment" on page 8 for package names.

   c. **To install the console only (English), type**

```
# pkgadd -d SUNWscsu
```

   d. **To add French, Japanese, or French language support, type**

```
# pkgadd -d SUNWxscsu
```

   where *x* is c, j, or f, depending on what language you are installing. See "Required Sun StorEdge Configuration Service Installation Packages for the Solaris Operating Environment" on page 8 for installation package names.

   e. **To install all packages, type**

```
# pkgadd -d . all
```

f. To select which packages to install from a menu, type

```
# pkgadd -d .
```

g. To install both agents only (Sun StorEdge Configuration Service and Sun StorEdge Diagnostic Reporter) (English), type

```
# pkgadd -d . SUNWscsd SUNWscsa
```

h. To add both agents only (Sun StorEdge Configuration Service and Sun StorEdge Diagnostic Reporter) with French, Japanese, or Simplified Chinese language support, type

```
# pkgadd -d . SUNWxscsd SUNWxscs
```

where *x* is c, j, or f, depending on what language you are installing. See "Required Sun StorEdge Configuration Service Installation Packages for the Solaris Operating Environment" on page 8 for installation package names. For Sun StorEdge Diagnostic Reporter package names, refer to the *Sun StorEdge 3000 Family Diagnostic Reporter User's Guide.*

3. Provide appropriate responses to each of the standard installation prompts.

The installation prompts are standard `pkgadd -d` prompts regarding which packages to install and how to process scripts (with superuser privileges).

a. At the `Select` packages prompt, type the appropriate response depending on the install method.

For example, if you chose 2a or 2b, type 1 and press Return.

```
Select package(s) you wish to process (or 'all' to process all
packages). (default:all) [?,??,q]: 1
```

b. If you have previously installed the agent, you are asked if you want to restore its configuration.

Type **y** to restore the configuration. If you type **n**, you will need to re-enable the managing servers.

Note – User passwords are deleted when Sun StorEdge Configuration Service is uninstalled. If you had a previous configuration, you have to reenter the `ssmon`, `ssadmin`, and `ssconfig` passwords as described in "Users and Passwords" on page 14.

```
The previous configuration was saved. User passwords must be
reentered. Do you want to restore the configuration [y,n,?,q]: y
```

c. If you have previously installed the console, you are asked if you want to restore its configuration.

Press **y** to restore the configuration. If you type **n**, you will need to readd the server information.

```
The previous configuration was saved. Do you want to restore the
configuration [y,n,?,q]: y
```

d. To continue with the installation, type `y` and press Return.

```
Do you want to continue with the installation [y,n,?] y
```

After the agent is installed, the following message is displayed indicating the agent installed successfully and has started.

```
Configuring and starting Sun StorEdge(tm) Configuration Service
agent daemons:
       The configuration is complete.
      Sun StorEdge(tm) Configuration Service agent server daemon
has started.
     Sun StorEdge(tm) Configuration Service agent monitor daemon
has started.
Sun StorEdge(tm) Configuration Service agent startup is complete.

Installation of <SUNWscsd> was successful.
```

The installation program checks that Java runtime environment 1.2 software or later is installed. If it cannot find it, you are asked to specify the path. If you know that Java runtime environment 1.2.2, 1.3, or 1.4 software has been installed but the installation program cannot find it, check the `/usr` directory to confirm there is a link from Java to the latest version instead of Java 1.1. For instructions on creating the link, see "Troubleshooting" on page 243.

The agent and console are installed in the following directory: `/opt/SUNWsscs/sscsconsole`.

4. **To access online help, you need to specify the path to the web browser (Netscape 4.0 or later).**

   a. Change to `/opt/SUNWsscs/sscsconsole` and type

   ```
   ./config_sscon
   ```

   b. Type the absolute path to the web browser.

Note – You can configure the browser pathname at any time; however, if you do not specify a browser pathname at some point, you cannot access online help.

---

5. **For Sun StorEdge 3310 SCSI arrays, edit `/kernel/drv/sd.conf` if:**

   - Third-party HBAs with multiple drives and multiple LUNs are used
   - Fibre devices are used
   - All LUNs have the same ID

   Add lines for logical units numbers (LUNs) as appropriate for your configuration. LUNs can be numbered from 0-31. Generally, do not add more LUN definitions than you actually plan to have since doing this increases the time needed to scan each SCSI bus, whether or not it has storage connected. For information on modifying the `sd.conf` file, refer to the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your SCSI array.

6. **Only if the `sd.conf` file has been edited, perform a reconfiguration reboot.**

▼ To Start or Stop the Agent

The agent can be stopped and started manually by using the run commands script in `/etc/init.d/ssagent`.

1. **To start the agent, type**

```
# /etc/init.d/ssagent start
```

Note – To start the agent you must have superuser privileges.

If `start` is used without having used `stop` first, the script restarts any agents that have stopped. If all the agents have stopped (as with a `stop` option), the script reconfigures the runtime environment before restarting the agents.

2. **To stop the agent, type**

```
# /etc/init.d/ssagent stop
```

3. **To determine if the agent is running, type**

```
# ps -e | grep ss
```

Both `ssmon` and `ssserver` are displayed in the output. If you have enabled SNMP trap generation, you also see the name `sstrapd`.

4. **If the storage system is not being displayed after initial boot, stop the agent, and at the command prompt, run**

```
# format
```

5. **Label the desired disks, and then restart the agent.**

Users and Passwords

The following sections explain how to create users and passwords.

Administrative (User) Security Levels and Guidelines

If you are running the program on a system using the Solaris operating environment**,** *administrator security levels are automatically created during the installation process.* You only need to set passwords and assign users according to the desired permission level.

Administrative functions require access logins and passwords to prevent the possibility of one administrator reallocating or removing storage resources belonging to other clients and hosts without authorization.

You assign separate passwords for the three levels of security for the program. You do this by setting up three users on the agents that have storage devices that are managed by the program. These three users are automatically added during the installation of the agent.

The security levels must have these exact names:

- `ssmon`

  Represents the monitoring level of the software.

- `ssadmin`

  Represents the administration level of the software and provides access to the Rebuild, Parity Check, and Schedule Parity Check functions, as well as monitoring.

- `ssconfig`

  Represents the configuration level of the software and gives the installer direct access to the configuration functions and all other related aspects of the program.

These login names are required for the three security levels. After installation, you must assign a password to each security name.

`ssmon`, `ssadmin`, and `ssconfig` are logins that correspond only to security levels within the program. For UNIX operating environments (Solaris or Linux OEs), the default shell for these accounts is assigned to `/bin/false` to prevent the user IDs from being used for interactive logins.

Sun StorEdge Configuration Service can be set up so that monitoring does not require users to type the `ssmon` password. This is done by selecting the Auto Discovery option when the servers are added to the Managed Servers list at the console. You can set up these three logins and passwords locally on each server. (The accounts can have different passwords on each server, if desired.)

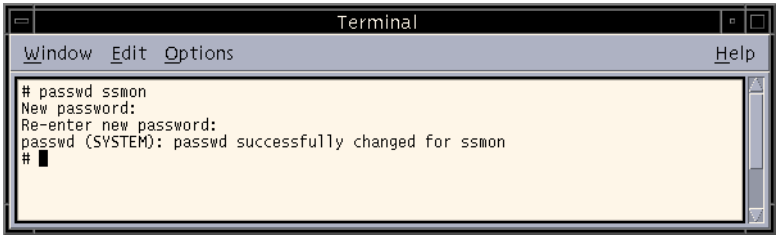
Once you have set up these three logins on the agents to be managed, the system administrator typically provides user access to the program by assigning employees appropriate passwords, which are based on the level of security required to complete tasks. For example, everyone who has administration privileges on a particular server is assigned the same password that was established for the user `ssadmin`.

Note – To add servers to the Managed Servers List see “To Add Servers” on page 43.

▼ To Create Passwords and Permissions

Create a password for each of the new users by typing

```
# passwd user-name
```



Administrators might also want to change group permissions, which are defined in the `svrlist.dat` file located in the `/opt/SUNWsscs/sscsconsole` directory during installation.

The console is a Java program-based utility, and as such, cannot provide facilities to control permissions or ownership of files that Sun StorEdge Configuration Service creates. The `svrlist.dat` file is easily readable by various forms of ASCII text processors. It contains the encrypted password for the user `ssmon` and can be decrypted.

Note – Do not change the permissions and group ownership of `svrlist.dat` after adding all agents that are being monitored.

Uninstalling Sun StorEdge Configuration Service

You must uninstall Sun StorEdge Configuration Service when upgrading the console or agent. Note that some files are not removed because they are created after the installation and are still valid for the upgrade environment.

▼ To Uninstall Sun StorEdge Configuration Service

Use the `pkgrm` command followed by the package you want to uninstall.

Note – If you added French, Japanese, or Simplified Chinese language support, you need to uninstall those packages *before* uninstalling the English package.

```
# pkgrm SUNWxxxxx
```

where xxxxx is the package you are uninstalling. See “Required Sun StorEdge Configuration Service Installation Packages for the Solaris Operating Environment” on page 8 for package names.

Restoring a Configuration

If you reinstall the agent or console, during the installation procedure, you are asked whether you want to restore the configuration. If you select to have the configurations restored, the information is restored from the following files:

- /var/opt/SUNWsscs/sscsagt.cfg.tar – Sun StorEdge Configuration Service Agent
- /var/opt/SUNWsscs/sscscon.cfg.tar – Sun StorEdge Configuration Service Console

---

Note – If you are removing Sun StorEdge Configuration Service permanently, you might want to manually remove these files; however, if you reinstall the program, you will not be able to restore the agent and console configurations.

CHAPTER 4

Installing Sun StorEdge Configuration Service on Windows NT or 2000 Operating Systems

This chapter provides procedures for installing Sun StorEdge Configuration Service Consoles and Agents on Windows NT/2000 operating systems. Topics covered in this chapter are as follows:

- "System Requirements" on page 19
- "Prior to Installing Sun StorEdge Configuration Service" on page 20
- "Installing Software" on page 21
- "Users and Passwords" on page 23
- "Uninstalling Sun StorEdge Configuration Service" on page 25

System Requirements

- Netscape 4.0 or later or Microsoft Internet Explorer 4.0 or later – To view online help.
- TCP/IP compliant network interface for the console – Each console must have a TCP/IP compliant network interface (such as an Ethernet or Token Ring network card, or a serial line with a modem).
- The console is best viewed with a monitor resolution of 1024 x 768 pixels with 256 colors. For other console requirements, see the following table.

TABLE 4-1 Console System Requirements

OS Version	Memory	Disk Space
Windows NT 4.0 (SP 3 or later) Windows 2000	32 MB minimum 64 MB recommended	20 MB free disk space minimum 40 MB recommended

- TCP/IP compliant network interface for the agent – Each agent must have a TCP/IP capable network card interface and driver set (included with the operating system). For other agent requirements, see the following table.

TABLE 4-2 Agent System Requirements

OS Version	Memory	Disk Space
Windows NT 4.0 (Service Pack 3, 4, 5 or 6) Windows 2000	32 MB minimum or 64 MB or more recommended. Requirement is determined by other large application programs, such as databases.	2 MB free disk space

Prior to Installing Sun StorEdge Configuration Service

Note the following required procedures and additional options prior to installing the program and its related software components.

- Be sure to read the release notes for your array**.**
- If your operating environment contains an enterprise management console, you can optionally configure agents to send trapped events to the console using the SNMP service. The SNMP service is included with the operating environment and is installed after installing the TCP/IP protocol stack.
- If you want the servers on your network to send SNMP traps to the enterprise management console, see “Email and SNMP” on page 229.
- *Optional*. To install and use Sun StorEdge Diagnostic Reporter, a companion utility of Sun StorEdge Configuration Service that reports your storage system events to specified email addresses, refer to the *Sun StorEdge 3000 Family Diagnostic Reporter User’s Guide*.

- *Optional*. To use multipathing, Sun StorEdge Traffic Manager software is required (included in the Sun StorEdge SAN Foundation software). Refer to the "Other Supported Software" section in the release notes for your array for more information.

Note – You must be administrator to install Sun StorEdge Configuration Service and run the console.

Installing Software

Sun StorEdge Configuration Service includes the following components:

- Sun StorEdge Configuration Service Agent.
- Sun StorEdge Configuration Service Console.
- Diagnostic Reporter (optional utility_ – For installation and operation details, refer to the *Sun StorEdge 3000 Family Diagnostic Reporter User's Guide*.
- Command-Line Interface (CLI) – For installation information, refer to the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array.

Install the agent on each server whose storage is managed by Sun StorEdge Configuration Service. Install the console on the computer or workstation you plan to use for managing and maintaining the system storage.

Installation Packages

The installation package, `setup.exe`, is contained on the Sun StorEdge 3000 Family Professional Storage Manager CD, and includes the following components:

- Sun StorEdge Configuration Service Agent
- Sun StorEdge Configuration Service Console

▼ To Install the Agent and Console

You need to install the agent on every Windows NT or 2000 server whose storage you want Sun StorEdge Configuration Service to manage.

Note – Make sure Java runtime environment 1.2 software or later is installed on the computer or workstation on which you are installing the console.

---

1. **To make sure the software installation utility functions optimally, close all open Windows applications.**
2. **Insert the Sun StorEdge 3000 Family Professional Storage Manager CD and change to the** `\product\windows` **directory.**
3. **Double-click setup.exe and select the software component to install,** `SUNWsscs Agent` **or** `SUNWsscs Console`**.**
4. **On the Choose Destination Location window, install the default folder and click Next. The agent is installed in** `C:\Program Files\Sun\ssagent`; **the console is installed in** `C:\Program Files\Sun\sscs`.

   To install to a different folder, click Browse, select another folder, and click Next.

   After the installation is complete, the agents start automatically.

▼ To Start or Stop the Agent on Windows NT Servers

To start the agent on the server, you must either reboot the server or start the three Sun StorEdge Configuration Service services: SUNWscsd Startup, SUNWscsd Server, and SUNWscsd Monitor under Settings → Control Panel → Services.

To stop the agent, go to Settings → Control Panel → Services, select the agent you want to stop, and click Stop.

▼ To Start and Stop the Agent on Windows 2000 Servers

1. **Select Start → Administrative Services → Computer Management.**
2. **Click Services & Applications.**
3. **Right-click the service (SUNWscsd Monitor, SUNWscsd Server, SUNWscsd Startup) you want to start or stop.**

   Alternatively, you can use **Start → Settings → Control Panel → Admin Tools → Computer Management**.

Users and Passwords

The following sections explain how to create users and passwords.

Administrator (User) Security Levels and Guidelines

Administrative functions require access logins and passwords to prevent the possibility of one administrator reallocating or removing storage resources belonging to other clients and hosts without authorization.

You assign separate passwords for the three levels of security. You do this by setting up three users on the agents that have storage devices that are managed by the program.

The security levels must have these exact names:

- `ssmon`

  Represents the monitoring level of the software.

- `ssadmin`

  Represents the administration level of the software and provides access to the Rebuild, Parity Check, and Schedule Parity Check functions, as well as monitoring.

- `ssconfig`

  Represents the configuration level of the software and gives the installer direct access to the configuration functions and all other related aspects of the program.

These names are required for the three security levels. After installation, you must assign a password to each security name.

`ssmon`, `ssadmin`, and `ssconfig` are logins that correspond only to security levels within the program.

Sun StorEdge Configuration Service can be set up so that monitoring does not require users to enter the `ssmon` password. This is done by selecting the Auto Discovery option when the servers are added to the Managed Servers list at the Console. You can set up these three logins and passwords locally on each server. (The accounts can have different passwords on each server.)

Once you have set up these three logins on the agents to be managed, the system administrator then typically provides user access to the program by assigning employees appropriate passwords, which are based on the level of security required to complete tasks. For example, everyone who has administration privileges on a particular server would be assigned the same password that was established for the user `ssadmin`.

Note – To add servers to the Managed Servers list, see "To Add Servers" on page 43.

Global Passwords on Multiple Servers

If you have a large network and do not want to set up logins individually, and it is acceptable to have the same passwords on multiple servers, you can establish the three logins on a domain server under Microsoft Windows. As a result, all other servers within the Microsoft Windows domain can access the three logins along with their respective passwords.

▼ To Create Windows NT Users

1. **Add users with the NT User Manager program.**
2. **Select Policies and then User Rights.**
3. **Select Show Advanced User Rights.**
4. **Give the NT User Administrator the Rights to Act as a part of the operating system.**
5. **Under User Properties, deselect User Must Change Password at Next Login.**
6. **Under User Properties, select User Cannot Change Password and Password Never Expires.**

7. **If you plan to set up the user names on a domain server so that multiple server setups are not required, be sure that the servers you want to manage belong to the domain where you have established the Sun StorEdge Configuration Service user account.**

   Refer to your Windows NT documentation for more information.

▼ To Create Windows 2000 Users

1. **Under Settings → Control Panel → Administrative Tools → Computer Management → System Tools → Local Users and Groups, select Users.**
2. **Right-click the Users folder and select New User to add the three users (**`ssmon`**,** `ssconfig`**, and** `ssadmin`**).**
3. **Add one of the users under User name. Enter a description if desired under Description.**
4. **Enter a password and if desired, select User Cannot Change Password and Password Never Expires.**

Uninstalling Sun StorEdge Configuration Service

Use the Windows Add/Remove Programs utility to remove Sun StorEdge Configuration Service from a Microsoft Windows Console.

▼ To Uninstall Sun StorEdge Configuration Service

1. **Go to Start → Settings → Control Panel → Add/Remove Programs.**
2. **Select the Sun StorEdge Configuration Service Agent and select Add/Remove. Respond appropriately to the prompts.**
3. **Select the Sun StorEdge Configuration Service Console and select Add/Remove. Respond appropriately to the prompts.**

CHAPTER 5

Installing Sun StorEdge Configuration Service on Systems Running the Linux Operating Environment

This chapter provides procedures for installing Sun StorEdge Configuration Service Consoles and Agents on systems running the Sun Linux or Red Hat Linux operating environment. Topics covered in this chapter are as follows:

- "System Requirements" on page 27
- "Prior to Installing Sun StorEdge Configuration Service" on page 28
- "Installing Software" on page 29
- "Users and Passwords" on page 32
- "Uninstalling Sun StorEdge Configuration Service" on page 35

System Requirements

- Netscape™ 4.0 or later – To view online help.
- TCP/IP compliant network interface for the console – Each console must have a TCP/IP compliant network interface (such as an Ethernet or Token Ring network card, or a serial line with a modem).
- The console is best viewed with a monitor resolution of 1024 x 768 pixels with 256 colors. For other console requirements, see the following table.

TABLE 5-1 Console System Requirements

Linux Version	Memory	Disk Space
Sun Linux 5.0 Red Hat Linux 7.2 and 7.3	256 MB minimum	10 MB

- TCP/IP compliant network interface for Agent – Each agent must have a TCP/IP capable network card interface and driver set (included with the operating environment). For other agent requirements, see the following table.

TABLE 5-2 Agent System Requirements

Linux Version	Memory	Disk Space
Sun Linux 5.0 Red Hat Linux 7.2 and 7.3	128 MB minimum	1 MB

Prior to Installing Sun StorEdge Configuration Service

Note the following required procedures and additional options prior to installing the program and its related software components.

- Be sure to read the release notes for your array**.**
- If your operating environment contains an enterprise management console, you can optionally configure agents to send trapped events to the console using the SNMP service.
- If you want the servers on your network to send SNMP traps to the enterprise management console, see “Email and SNMP” on page 229.
- *Optional*. To install and use Sun StorEdge Diagnostic Reporter, a companion utility of Sun StorEdge Configuration Service that reports your storage system events to specified email addresses, refer to the *Sun StorEdge 3000 Family Diagnostic Reporter User’s Guide*.
- *Optional*. To use multipathing, Sun StorEdge Traffic Manager software is required (included in the Sun StorEdge SAN Foundation software). Refer to the “Other Supported Software” section in the release notes for your array for more information.

Note – You must be a superuser to install Sun StorEdge Configuration Service and run the console.

Installing Software

Sun StorEdge Configuration Service software includes the following components:

- Sun StorEdge Configuration Service Agent.
- Sun StorEdge Configuration Service Console.
- Diagnostic Reporter (optional utility) – For installation and operation details, refer to the *Sun StorEdge 3000 Family Diagnostic Reporter User's Guide.*
- Command-Line Interface (CLI) – For installation information, refer to the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array.

Installation Packages

The installation packages are contained on the Sun StorEdge 3000 Family Professional Storage Manager CD, and include the following files:

- `SUNWscsu.rpm` – Sun StorEdge Configuration Service Console
- `SUNWscsd.rpm` – Sun StorEdge Configuration Service Agent

▼ To Install the Agent and Console

Install the agent on each of the servers that is part of Sun StorEdge Configuration Service. Install the console on the computer or workstation you plan to use for managing and maintaining the storage system.

The Sun StorEdge Configuration Service Console package, `SUNWscsu.rpm`, can be installed on the server or on any client system. The Sun StorEdge Configuration Service Agent package, `SUNWscsd.rpm`, must be installed on the server to which the storage is attached.

Complete the following steps to install the agent, console, or both. You must install at least one agent and one console for the program to run.

Note – Make sure Java runtime environment 1.2 software or later is installed on the computer or workstation on which you are installing Sun StorEdge Configuration Service.

1. **If Java runtime environment 1.2 software or later is not installed on the computer or workstation on which you are installing Sun StorEdge Configuration Service, install it now.**
2. **Mount the CD ROM on your file system if it is not already mounted.**

```
# cd mount /dev/cdrom /mnt/cdrom
```

3. **Insert the Sun StorEdge 3000 Family Professional Storage Manager CD and type**

```
# cd /mnt/cdrom/product/linux
```

4. **Install the packages in one of the following ways:**

   a. **To install the agent only, type**

```
# rpm -ivh SUNWscsd.rpm
```

   b. **To install the console only, type**

```
# rpm -ivh SUNWscsu.rpm
```

5. **To access online help, a web browser has to be installed on the system on which you are installing the console. If a web browser is not detected, you are asked to specify the path to the web browser (Netscape 4.0 or later).**

   a. **Change to** `/opt/SUNWsscs/sscsconsole` **and type**

```
./config_sscon
```

   b. **Type the absolute path to the web browser.**

Note – You can configure the browser pathname at any time; however, if you do not specify a browser pathname at some point, you cannot access online help.

After the agent is installed, the following message is displayed indicating the components have installed successfully and have started.

```
# rpm -ivh SUNWscsd.rpm Preparing...
########################################### [100%] 1:SUNWscsd
########################################### [100%] add user ssmon
add user ssadmin add user ssconfig Configuring and starting Sun
StorEdge(tm) Configuration Service daemons[ OK ]
Starting Sun StorEdge(tm) Configuration Service agent daemon[ OK ]
Starting Sun StorEdge(tm) Configuration Service agent monitor
daemon[ OK ]
```

After the console is installed, the following message is displayed indicating the components have installed successfully and have started.

```
# rpm -ivh SUNWscsu.rpm Preparing...
########################################### [100%] 1:SUNWscsu
########################################### [100%]
Installation completed successfully!
```

The agent and console are installed in the following directory: `/opt/SUNWsscs/sscsconsole`.

▼ To Start or Stop the Agent

The agent can be stopped and started manually by using the run commands script in `/etc/init.d/ssagent`.

1. **To start the agent, type**

```
# /etc/init.d/ssagent start
```

or

```
# service ssagent start
```

Note – To start the agent you must have superuser privileges.

If `start` is used without having used `stop` first, the script restarts any agents that have stopped. If all the agents have stopped (as with a `stop` option), the script reconfigures the runtime environment before restarting the agents.

2. **To stop the agent, type**

```
# /etc/init.d/ssagent stop
```

3. **To determine if the agent is running, type**

```
# ps -e | grep ss
```

or

```
# service ssagent status
```

Both `ssmon` and `ssserver` are displayed in the output. If you have enabled SNMP trap generation, you also see the name `sstrapd`.

Users and Passwords

The following sections explain how to create users and passwords.

Administrative (User) Security Levels and Guidelines

If you are running the program on a system using the Linux operating environment**,** *administrator security levels are automatically created during the installation process.* You only need to set passwords and assign users according to the desired permission level.

Administrative functions require access logins and passwords to prevent the possibility of one administrator reallocating or removing storage resources belonging to other clients and hosts without authorization.

You assign separate passwords for the three levels of security for the program. You do this by setting up three users on the agents that have storage devices that are managed by the program. These three users are automatically added during the installation of the agent.

The security levels must have these exact names:

- `ssmon`

  Represents the monitoring level of the software.

- `ssadmin`

  Represents the administration level of the software and provides access to the Rebuild, Parity Check, and Schedule Parity Check functions, as well as monitoring.

- `ssconfig`

  Represents the configuration level of the software and gives the installer direct access to the configuration functions and all other related aspects of the program.

These names are required for the three security levels. After installation, you must assign a password to each security name.

`ssmon`, `ssadmin`, and `ssconfig` are logins that correspond only to security levels within the program. For UNIX operating environments (Solaris or Linux OEs), the default shell for these accounts is assigned to `/bin/false` to prevent the user IDs from being used for interactive logins.

Sun StorEdge Configuration Service can be set up so that monitoring does not require users to type the `ssmon` password. This is done by selecting the Auto Discovery option when the servers are added to the Managed Servers list at the console. You can set up these three logins and passwords locally on each server. (The accounts can have different passwords on each server, if desired.)

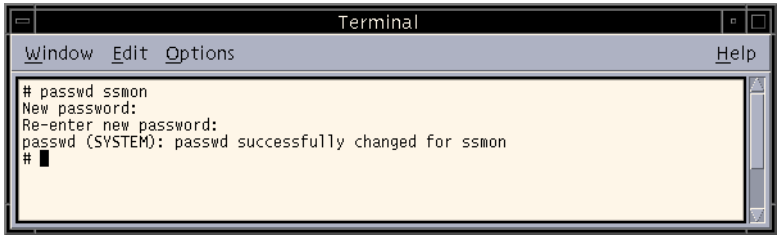
Once you have set up these three logins on the agents to be managed, the system administrator typically provides user access to the program by assigning employees appropriate passwords, which are based on the level of security required to complete tasks. For example, everyone who has administration privileges on a particular server is assigned the same password that was established for the user `ssadmin`.

Note – To add servers to the Managed Servers List see “To Add Servers” on page 43.

▼ To Create Passwords and Permissions

Create a password for each of the new users by typing

```
# passwd user-name
```



Administrators might also want to change group permissions, which are defined in the `svrlist.dat` file located in the `/opt/SUNWsscs/sscsconsole` directory during installation.

The console a Java technology-based based utility, and as such, cannot provide facilities to control permissions or ownership of files that Sun StorEdge Configuration Service creates. The `svrlist.dat` file is easily readable by various forms of ASCII text processors. It contains the encrypted password for the user `ssmon` and can be decrypted.

Note – Do not change the permissions and group ownership of `svrlist.dat` after adding all agents that are being monitored.

Uninstalling Sun StorEdge Configuration Service

You must uninstall Sun StorEdge Configuration Service when upgrading the console or agent. Note that some files are not removed because they are created after the installation and are still valid for the upgrade environment.

▼ To Uninstall Sun StorEdge Configuration Service

Use the `rpm -e` command followed by the package you want to uninstall, `SUNWscsu.rpm` (console) or `SUNWscsd.rpm` (agent).

```
# rpm -e SUNWscsu.rpm
```

```
# rpm -e SUNWscsd.rpm
```

CHAPTER 6

Setting Up Sun StorEdge Configuration Service

This chapter describes typical procedures for setting up Sun StorEdge Configuration Service. Procedures covered in this chapter are as follows:

- "Starting Sun StorEdge Configuration Service" on page 38
  - "To Start Sun StorEdge Configuration Service on Solaris or Linux Operating Environments" on page 38
- "Main Window Before and After First Use" on page 39
  - "To Add Servers" on page 43
  - "To Log In and Out" on page 49
  - "To Select a Server to Manage a Controller" on page 50
  - "To Configure Agent Parameters (Optional)" on page 54
  - "To Verify Storage Configurations" on page 57
  - "To Save the Logical Drive Configuration" on page 59
  - "To Create Partitions on a Server on a System Running the Solaris Operating Environment" on page 60
  - "To Create Partitions on a Server on a Windows 2000 Operating System" on page 63

Starting Sun StorEdge Configuration Service

Note – You must be a superuser/administrator to run the console.

Note – Because the console does not receive event alerts unless it is running, after configuring the array, always leave Sun StorEdge Configuration Service running in its *minimized* mode on the console workstation. Or, instead of keeping the console running, you can use Sun StorEdge *Diagnostic Reporter*, a companion utility of Sun StorEdge Configuration Service that runs as a background service that sends messages from the hosts and array to specified email addresses. For details, refer to the *Sun StorEdge 3000 Family Diagnostic Reporter User's Guide*. For another method of receiving event alerts, see "To Send SNMP Traps Without Using Sun StorEdge Configuration Service" on page 242.

Note – For Sun StorEdge Configuration Service to view and manage an array, each HBA card must be connected to the primary controller.

▼ To Start Sun StorEdge Configuration Service on Solaris or Linux Operating Environments

At the command prompt, type

```
# ssconsole
```

▼ To Start Sun StorEdge Configuration Service on Microsoft Windows NT/2000 Operating Systems

Select Start → Programs → Sun StorEdge 3000 Family → Configuration Service.

Main Window Before and After First Use

When the program initializes for the first time, the main window is blank. The Add Server window is displayed, enabling you to add servers to the Managed Servers list of the console you are using. For details on adding servers, see “To Add Servers” on page 43.

Whenever you start the program *after* the first time and *after* you have selected Managed Servers, the main window displays server icons for the servers on the Managed Servers list. Click OK or Cancel to continue.

After a new array is configured and the workstation is booted, the program might not see the array until the logical drives are labeled because Sun StorEdge Configuration Service uses native Sun drivers.

If Console Locks Up During Use

On systems running the Solaris or Linux operating environment, if the console locks up during use, you can stop Sun StorEdge Configuration Service, and then close and reopen the window without affecting the agent.

▼ To Stop Sun StorEdge Configuration Service

1. **At the command prompt, type**

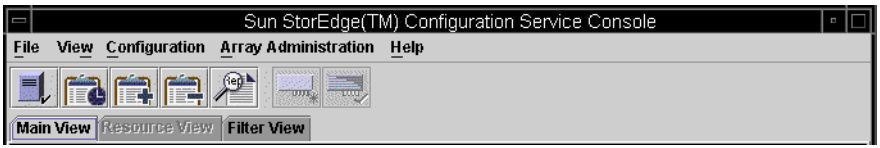
```
# ssconsole stop
```

2. **Run the program again.**

   The window is displayed again without affecting the agent.

The Menu, Toolbar, and Tabs

It is useful to review the main window, which includes a menu bar, tabs, and a toolbar for access to key functions.



Menu Bar

The following figure shows the main menu options.

File
- Server List Setup
- Login
- Logout
- Save Report
- View Report
- Exit

View
- Event Log
- View Group
- View Server
- View Controller
- View Logical Drive
- View Physical Drive
- View Enclosure
- View FRU
- Array Admin Progress
- Agent Options Management
- ☑ Display HDD under LD

Configuration
- Standard Configure
- Custom Configure
- Save Configuration
- Load Configuration
- Configure Host/WWN (Fibre Channel only)
- LUN Filter Properties (Fibre Channel only)

Array Administration
- Rebuild
- Parity Check
- Schedule Parity Check
- Controller Assignment
- Controller Maintenance
- Download FW for Devices
- View Peripheral Device

Help
- Contents
- About sscsConsole

Toolbar

Located below the menu bar, the toolbar provides icons that give you quick access to commonly used functions. Select an icon to activate its function. Toolbar icons can appear both as active or inactive (grayed), depending on what resources are available in the main window.

Icon	Description
	Server List Setup. Adds servers that the console manages, edits server information, or designates that an available server is managed.
	Event Log. View events such as storage device status changes, hardware status changes, or operational notifications.
	Save Event Log. Displays the Save Event Log File dialog box, which enables you to conveniently save the Event Log without having to go to the Event Log window.
	Delete Event Log. Manually deletes the contents of the eventlog.txt file. (The program accumulates events until the limit of 10,000 is reached, at which time the Event Log is automatically reduced to the most current 500 events.)
	Save Report. Creates a text file containing data about each of the storage components on the selected server as of the current date.
	Standard Configuration. Creates one or more logical drives with one RAID level on the selected array controller. Use when you want a predefined configuration where Sun StorEdge Configuration Service automatically configures storage.
	Custom Configuration. Provides multiple choices for configuring or reconfiguring logical drives or logical volumes with varying RAID levels on the selected array controller. Use when you want to manually define configuration including setting or changing controller IDs and parameters and defining or modifying RAID sets and standby drives.

Tabs

Located below the toolbar, tabs enable you to quickly move to other Sun StorEdge Configuration Service Views.

Tab	Description
	Click to go to the main Sun StorEdge Configuration Service window.
	Click to go to Resource Allocation View. (Reserved for future use.)
	Click to go to LUN Filter View. (Fibre Channel only.)

Physical (Hard) Drives

As the array becomes fully configured, the main window displays multiple components. The physical drives that make up the logical drives are displayed by default; however, to make the main window more manageable to navigate, you can choose not to display the physical (hard) drives by deselecting View → Display HDD under LD.

Navigating

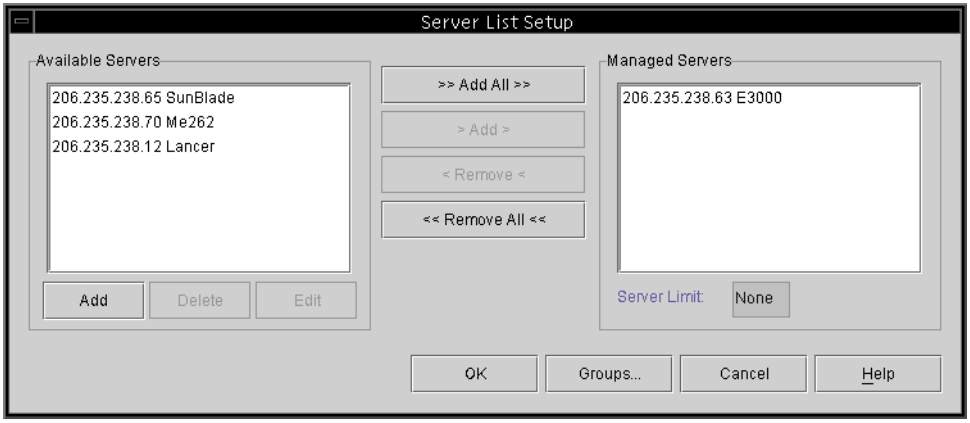
The program follows standard Java programming language keyboard and navigation operation.

▼ To Add Servers

Before you can monitor or configure a server, you need to add it to the Managed Servers list through Server List Setup.

1. **Start Sun StorEdge Configuration Service if it is not already running.**
2. **Select File → Server List Setup.**

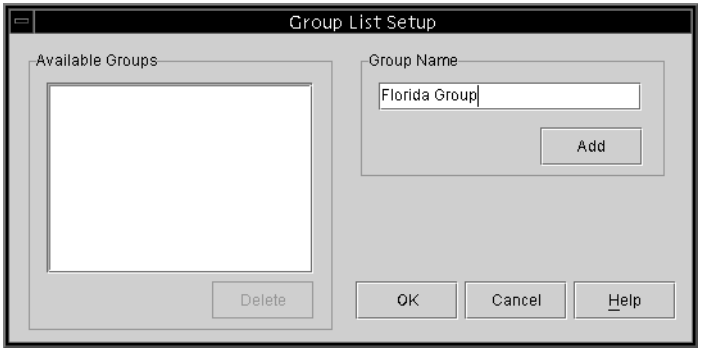
   The Server List Setup window is displayed.



3. **Organize the servers into groups:**

   a. **Click Groups in the Server List Setup window.**

      The Group List Setup window is displayed.



   b. **Type a name in the Group Name field and click Add.**

c. To delete a group, select the group name from the Available Groups list and click Delete.

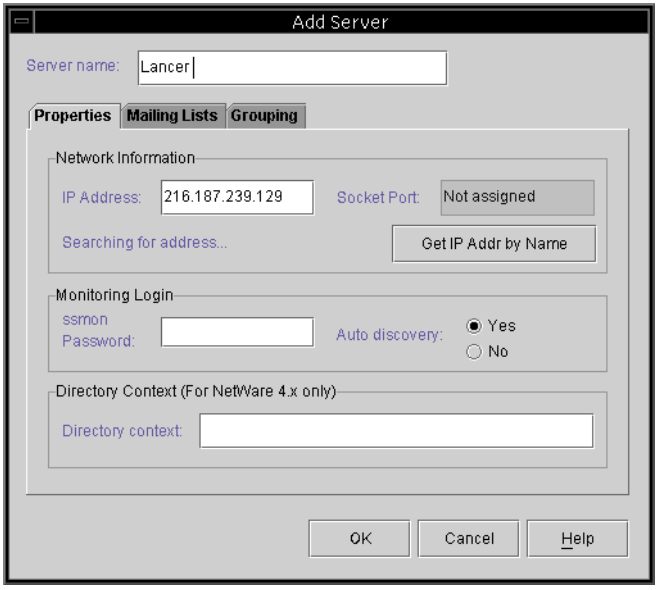
d. When you are finished adding and deleting groups, click OK.

The Server List Setup window is displayed.

4. Add a server:

a. Click Add under the Available Servers list.

The Add Server window is displayed.



b. Type the name of the server in the Server name field and press Return.

This is the name you use to identify the server. If this name is in your network's name server database, Sun StorEdge Configuration Service determines the server's IP address and displays it in the IP Address field.

If the program cannot find an IP address for the name, the name was either typed incorrectly or has not been recorded in the server's name database.

c. If necessary, type the server's TCP/IP address in the IP Address field.

For example, 192.168.100.1.

If the program has not already displayed the IP address (as described in the previous step), type the IP address manually.

Selecting Get IP Address by Name, located below the IP Address field, is another method of having the program search for the IP address and display it automatically. As mentioned in the previous step, it works only if your network has a name server database and you have typed the server name as it is recorded in the database. Otherwise, you must type the IP address manually.

5. Select or Deselect Automatic Discovery of servers:

a. Select No for Auto Discovery if you need a very secure environment where access even to server inventory data is restricted.

When you select No, the program does not retrieve server information when starting up. The server's icon appears color-coded white (instead of active purple) to indicate it is undiscovered. When you double-click an undiscovered server, Sun StorEdge Configuration Service prompts you for the `ssmon` user password. Optionally, you can also select the server and select File → Login.

Select Yes for Auto Discovery to retrieve all information available about this server when the console is started.

b. If you select Yes for Auto Discovery, type the same monitor password that was typed earlier when the `ssmon` user was set up on the server (or group of servers if you have a domain or a DNS tree).

Once the server(s) have been established using Auto Discovery, you do not need to type the `ssmon` password when you log into Sun StorEdge Configuration Service; *you automatically have monitoring privileges.*

However, whenever you choose a command to perform administration or configuration activities, you are prompted with a login dialog box to change your level of security by typing the password for either the `ssadmin` or `ssconfig` user that was established earlier.

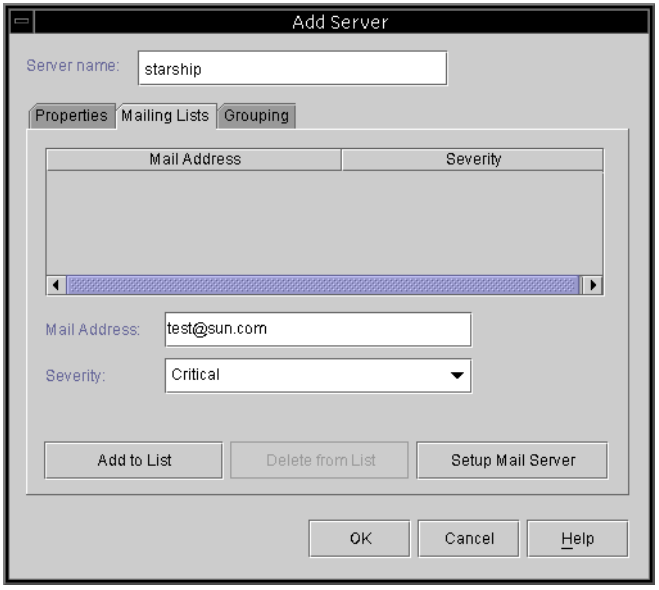
c. Click OK.

6. Set email addresses:

a. If you want Sun StorEdge Configuration Service to send event messages using email, select the Mailing Lists tab and continue with the following directions.

You might want to type your own email address and the addresses of selected users for the purpose of receiving information about critical events on the server.

Note – Instead of keeping the console running in the foreground, you can use Sun StorEdge Sun StorEdge *Diagnostic Reporter*, a companion utility of Sun StorEdge Configuration Service that runs as a background service that sends messages from the hosts and array to specified email addresses. For details, refer to the *Sun StorEdge 3000 Family Diagnostic Reporter User's Guide*. To ensure that Sun StorEdge Configuration Service receives email, see "Email and SNMP" on page 229 for information on setting traps. For another method of receiving event alerts, see "To Send SNMP Traps Without Using Sun StorEdge Configuration Service" on page 242.



b. For each user, type an email address in the Mail Address field.

c. In the Severity list box, scroll through the list of severity levels and choose from the following:

Critical – a message that requires intervention by the network administrator, such as failure of a device, power supply, or fan.

Warning – messages that generally indicate internal program events. If you see a large number of these messages, it might mean that there is a problem with the server or the network.

Informational – messages about the devices on the server that do not require intervention by the network administrator.

Whatever level you choose, you receive event messages for that level and any other levels at a higher severity. If you choose Informational, for example, you are notified of any form of malfunction. Conversely, if you want to be notified of only critical situations, select Critical, and you are not notified of any Informational or Warning events.

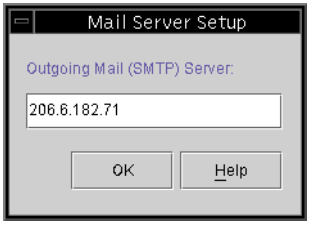
d. Click Add to List.

To delete a user from the list, select the mail address and click Delete from List.

e. Indicate the mail server to be used.

Note that the Setup Mail Server button toggles with Change Mail Server, depending on whether a mail server has been defined previously.

For new setups, click Setup Mail Server. A Mail Server Setup window similar to the following is displayed.



f. Type the IP address or name of the Simple Mail Transfer Protocol (SMTP) mail server that is delivering the email messages to the destination addresses specified earlier.

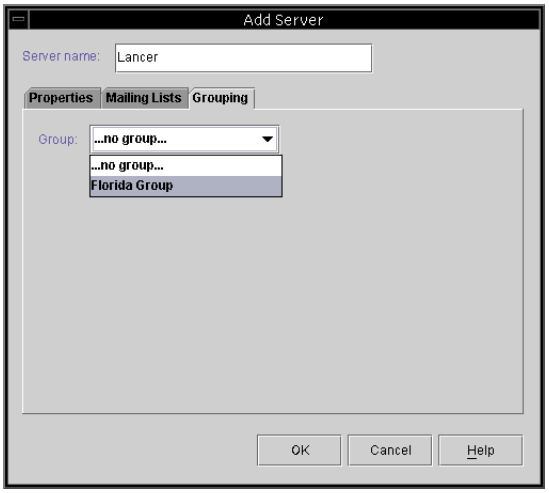
g. Click OK when you are satisfied with the information about the Mail Server window.

The Add Server window is displayed showing the Mailing Lists tab.

7. Complete the Add Server function:

a. If you want this server to be part of a group, select the Grouping tab.

The Add Server window is displayed.



b. Select the list box to view the choices available.

c. Select the desired group and release the mouse button.

d. Click OK to register the change.

8. If you want to add more servers, repeat Steps 3 through 7 for each server.

9. Move the servers you want this console to control to the Managed Servers list (see "To Add Servers" on page 43).

- If you want this console to manage all the available servers, click Add All located at the top of the dialog box.
- To move individual servers to the managed column, select each server individually and click Add located between the two list boxes.
- If during the process of adding servers, modifications need to be made, see "To Edit a Server Entry" on page 191.

10. When you are finished adding servers, click OK to return to the main window.

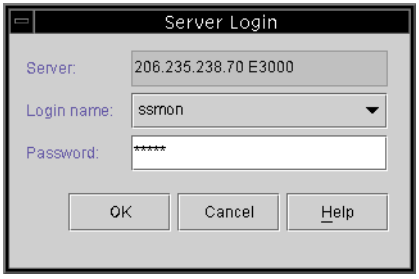
Note – If the array is attached to multiple hosts and an agent is installed on each host, each host's IP address must be entered and added to the Managed Servers list.

▼ To Log In and Out

The log in and log out functions provide security within the program. The security levels are established by setting up three users: `ssmon`, `ssadmin`, and `ssconfig`, each with a password.

- `ssmon` represents the monitoring level of the software; it displays alerts from the controller.
- `ssadmin` represents the administration level of the software; it provides access to Rebuild, Parity Check, and Schedule Parity Check functions, as well as monitoring.
- `ssconfig` represents the configuration level; it provides access to the configuration commands and all aspects of the program.

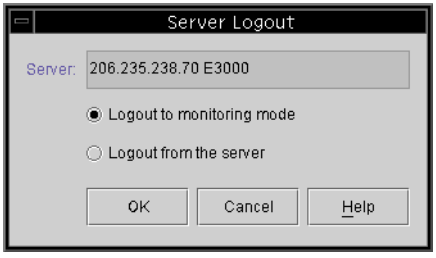
1. **To log in, choose File → Login.**



Maintain continuous access only as the monitoring user. When you select a command that requires the administration or configuration level, a login dialog box is displayed and you log into that level with the appropriate password. After completing your activity, log out.

2. **To log out, choose File → Logout.**

When you log out from the administration or configuration level, you are given the option of logging out to the monitoring mode or logging out from the server entirely.



▼ To Select a Server to Manage a Controller

To manage and monitor an array, the agent needs to have access to a host LUN mapped to a partition of a logical drive assigned to the primary controller of the array.

The agent ignores all host LUNs mapped to a partition of a logical drive assigned to a secondary controller in a redundant configuration of an array.

Note – See “RAID Basics” on page 195 for a discussion of logical drives and LUNs.

If the same array is connected to multiple servers, it is possible to have the agent running on each of these servers trying to manage and monitor the same array. Due to a restriction on monitoring commands to be sent to the array controller by only one server at a time, some monitoring commands might fail if sent simultaneously by multiple servers. This could cause inaccurate reporting or the processes to stop responding. To prevent this from happening, the agent can be configured to enable / disable array monitoring on a server.

Assigning a Controller Through the Console

The following procedure can be performed from the console to assign server control to a controller.

1. **Make sure all directly attached servers were added following the directions in “To Add Servers” on page 43.**

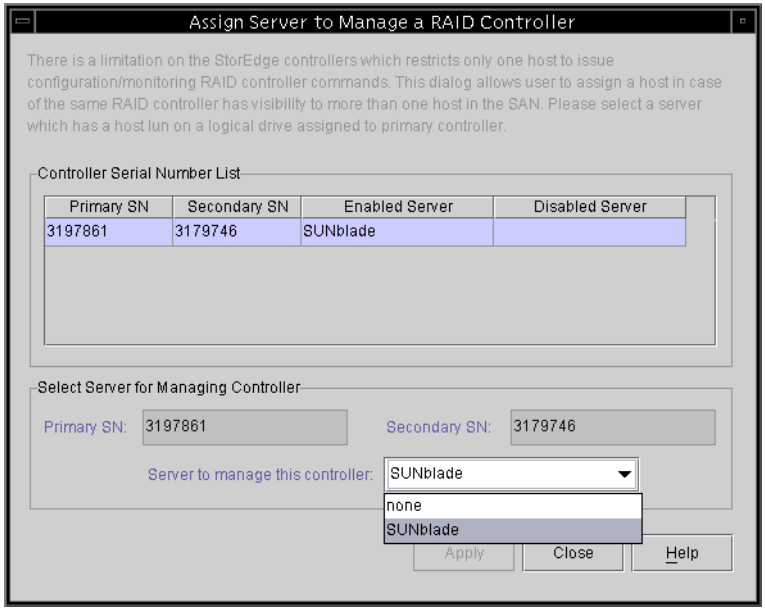
   This ensures that both Host names are present under Controller Assignments.

2. **From the main window, click Array Administration → Controller Assignment.**

   The Assign Server to Manage a RAID Controller window is displayed.

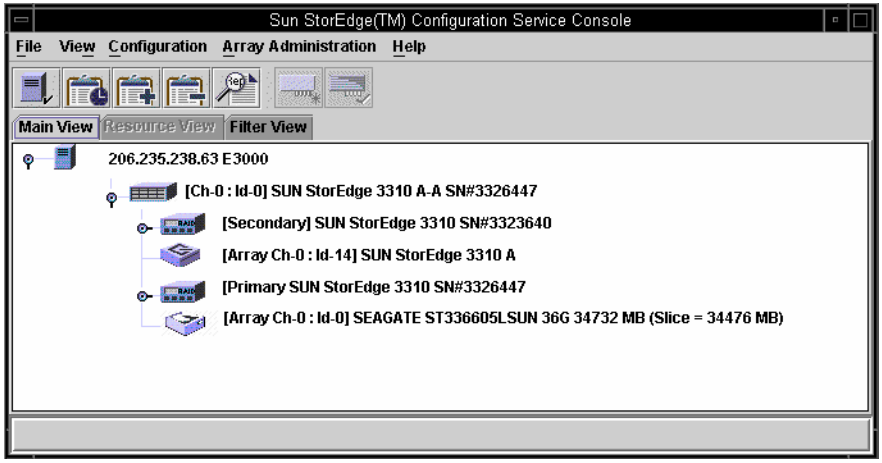
3. **Select a server from the Server to manage this controller list and click Apply.**

   This enables the selected server to manage an array controller. It also disables all other servers listed from managing the same array.


Assign Server to Manage a RAID Controller
There is a limitation on the StorEdge controllers which restricts only one host to issue configuration/monitoring RAID controller commands. This dialog allows user to assign a host in case of the same RAID controller has visibility to more than one host in the SAN. Please select a server which has a host lun on a logical drive assigned to primary controller.
Controller Serial Number List
Primary SN
Secondary SN
Enabled Server
Disabled Server
3197861
3179746
SUNblade
Select Server for Managing Controller
Primary SN:
3197861
Secondary SN:
3179746
Server to manage this controller:
SUNblade
none
SUNblade
Apply
Close
Help

4. Click Close to close the view.

The main window shows the array controller device icon only under the server where the monitoring is enabled for this array.

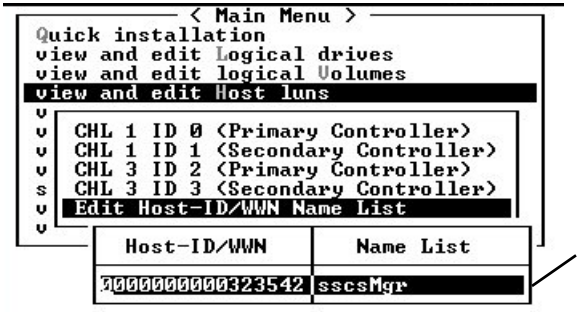


Changing a Server Assignment

When you assign a server to manage a controller, information regarding the managing server is produced. The program stores this information on a controller and uses it to keep track of the managing server. In the event a server is shut down, for maintenance for example, and you try to assign another server to manage the controller, the program reads the stored server information from the controller and warns you that the controller is being managed already.

Note – You can override the current server assignment if you want to force a new server assignment.

You can view the managing server name using the firmware application menu called view and edit Host luns → Edit Host-ID/WWN Name List.



The server name is stored in hexadecimal values for the ASCII character set.

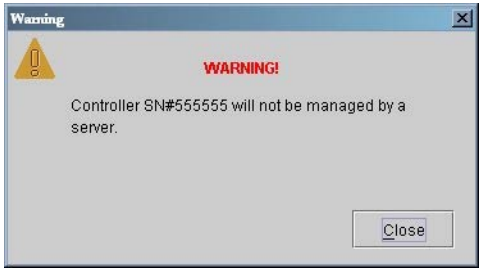
If you want to change a server assignment, for example, because you are moving an array to a new location, *before* you move the array, you need to unassign the managing server following the steps in “To Unassign the Managing Server” on page 53.

If you have already moved the array, when the array starts up, you might see the warning message that the controller is already being managed by another server. You need to manually delete the server following the steps in “To Manually Delete a Server Using the Terminal Window” on page 53. Refer to the *Sun StorEdge 3000 Family RAID Firmware User’s Guide* for your array for information about accessing the firmware application.

▼ To Unassign the Managing Server

1. **From the main window, click Array Administration → Controller Assignment.**
2. **Select the array controller for which you want to unassign a server.**
3. **From the Server to manage this controller: list box, select none.**

   Click Close to the following warning that is displayed confirming that the selected controller will no longer be managed by a server.



4. **Select the server you want to manage the controller following the steps in “Assigning a Controller Through the Console” on page 50.**

▼ To Manually Delete a Server Using the Terminal Window

Refer to the *Sun StorEdge 3000 Family RAID Firmware User’s Guide* for your array for information about accessing the firmware application.

1. **From the Main Menu, select view and edit Host luns, and press Return.**
2. **Select Edit Host-ID/WWN Name List, and press Return.**
3. **Select sscsMgr from the Name List, and press Return.**
4. **Select Delete Host-ID/WWN Name List, and press Return.**
5. **Select Yes, and press Return.**

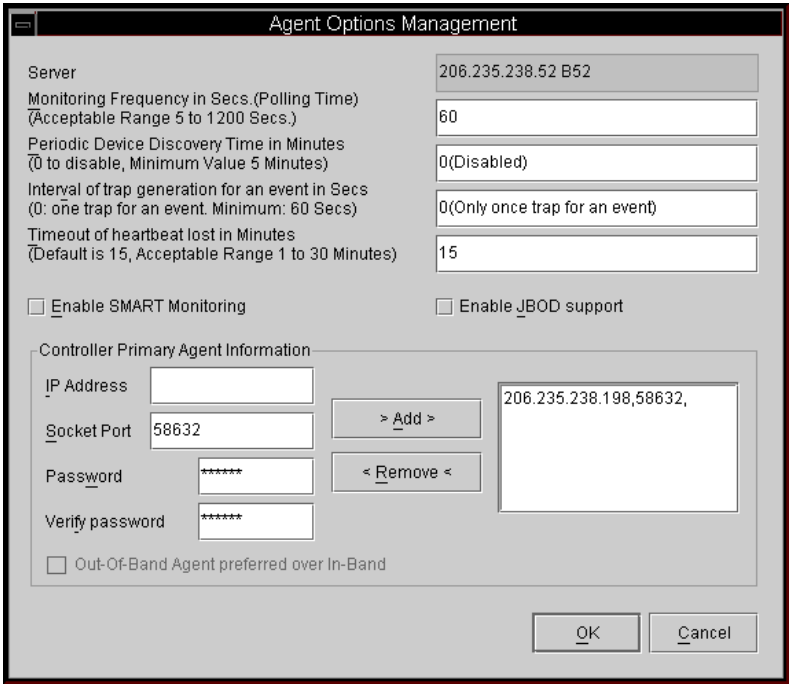
▼ To Configure Agent Parameters (Optional)

This section provides steps to configure agent parameters, including polling time, periodic device discovery time, smart monitoring, out-of-band storage management, and enabling JBOD support using the View → Agent Options Management command.

1. **From the main window, select View → Agent Options Management.**

   The Agent Options Management window is displayed.

Note – Agent Options Management might not be available if one or more groups are configured and one of them is selected in the main window. To enable it, select an icon other than a group, and click View.



2. **For Monitoring Frequency in Seconds, type the desired number in seconds.**

   This value is the interval between successive polling for any status change of devices, array controllers, and enclosure monitoring by the agent. The default value is 60 seconds. If you want the console to update more frequently with device status changes, decrease this value.

Note – Increasing the polling interval could negatively impact error messaging under heavy I/O load.

3. **For Periodic Device Discovery, type the value in minutes you want to check for new devices.**

   The periodic device discovery value is used to determine how often each device ID is scanned for a new device. The default value of 0 means do not scan for new devices. Note that device IDs are scanned less frequently as the numerical value increases.

   Conversely, device IDs are scanned more frequently as the numerical value decreases. Five minutes is the minimum value.

4. **For Interval of trap generation, type the amount of time (in seconds) between the sending of each trap message.**

   If the value is 60 seconds or greater, a message is sent at that interval, for that particular trap, until the event is cleared or corrected. For example, if a fan fails, a message regarding that fan failure is sent every 60 seconds until fixed.

   If the value is 0, Sun StorEdge Configuration Service (and therefore Sun StorEdge Diagnostic Reporter) sends only one message regarding that particular event. For example, if a fan fails, only one email is sent.

5. **For Timeout of heartbeat lost, set the amount of time in minutes to wait between the sending of failed server messages.**

   The default value is 15 minutes; the value range is 1 to 30 minutes.

6. **To Enable SMART Monitoring, select the check box.**

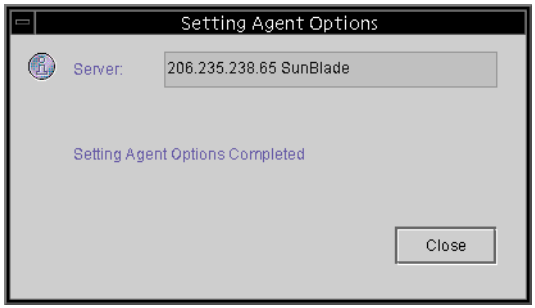
   SMART monitoring is a method for hard drives to report predicted failures. Most disk vendors supply drives with this feature. The agent monitors this feature by issuing an unsolicited request sense. SMART monitoring can be turned off if this request causes conflicts with the underlying host operating environment/system device drivers. For more information on SMART monitoring, refer to the *Sun StorEdge 3000 Family RAID Firmware User's Guide* for your array.

7. **To Enable JBOD support, see "To Enable JBOD Support (SCSI Only)" on page 56.**

8. **The parameters under Controller Primary Agent Information, including the Password fields, pertain to out-of-band management. See "To Use Out-of-Band Management" on page 129 for information on configuring these parameters.**

9. **If you have selected any of the previous options, click OK to save your changes.**

The Setting Agent Options notification message box is displayed showing the server's TCP/IP address.



10. **Click OK to finish the procedure.**

▼ To Enable JBOD Support (SCSI Only)

For Sun StorEdge 3310 SCSI arrays, use Just a Bunch of Disks (JBOD) support only when you have a JBOD connected directly to the workstation. This enables you to monitor the peripheral device condition and events. If you have a JBOD connected to the RAID array, the RAID controllers monitor the JBOD condition and events for you.

Note – Enabling JBOD support could impact I/O.

---

1. **Follow the steps in "To Configure Agent Parameters (Optional)" on page 54.**
2. **Select Enable JBOD support.**

   For details on monitoring a JBOD, see "Monitoring JBODs (SCSI Only)" on page 211.

▼ To Verify Storage Configurations

Once you have installed Sun StorEdge Configuration Service and added all the servers for storage that you want managed, you need to verify the storage configurations.

Note – Most arrays are shipped preconfigured. If you want to completely remove the existing configuration and start over, see “Full Configuration” on page 65. If you want to change the current configuration or add to it, see “Updating the Configuration” on page 151.

---

1. **Make sure the server icon is online (that is, the server symbol is purple).**

   During power up, Sun StorEdge Configuration Service starts automatically.

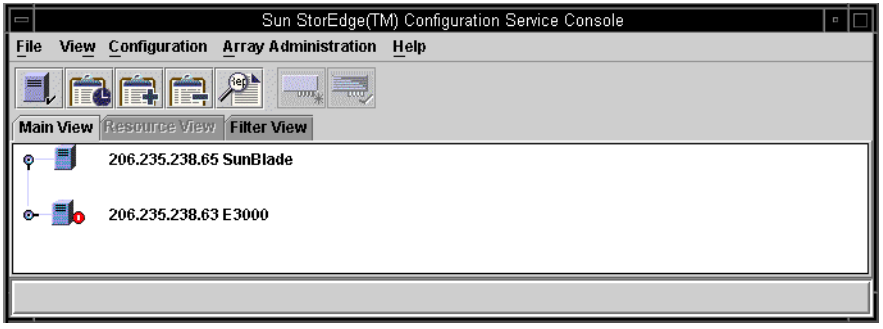
2. **Observe the main window and check the storage configuration.**

3. **If you have multiple managed servers, select the server you want to check.**

   If the server icon is not purple, determine the server’s state (see TABLE 9-1). If the server’s icon has a satellite dish attached to it , the server might be in the discovery process and is available after a short delay.

4. **Click the container symbol that appears to the left of the server whose storage you want to check.**

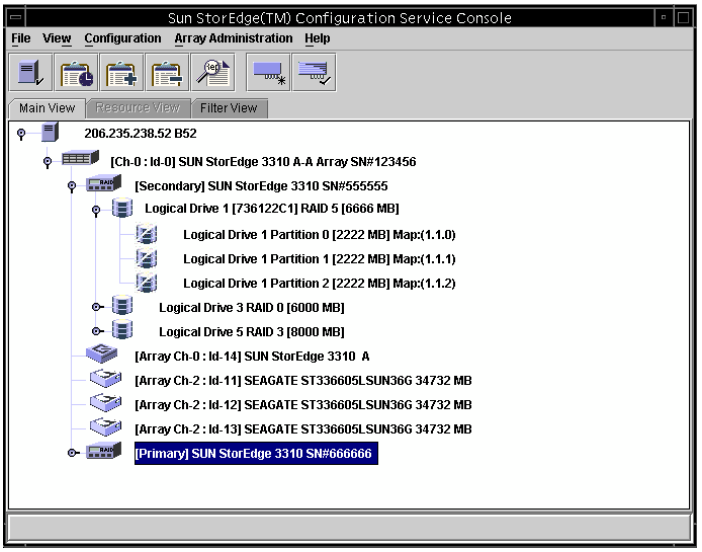
   The program graphically displays each array controller connected to the server as shown in the following figure.



5. **To see other details, click the container symbol next to the array controller whose storage you want to check.**

   If the array has not yet been configured, no logical drives (LUNs for controllers) are displayed.

   If the array has been fully configured, the program displays the devices and logical drives that are associated with the selected array controller. It looks similar to the devices displayed in the following figure.


Sun StorEdge(TM) Configuration Service Console
File View Configuration Array Administration Help
Main View Resource View Filter View
206.235.238.52 B52
[Ch-0 : Id-0] SUN StorEdge 3310 A-A Array SN#123456
[Secondary] SUN StorEdge 3310 SN#555555
Logical Drive 1 [736122C1] RAID 5 [6666 MB]
Logical Drive 1 Partition 0 [2222 MB] Map:(1.1.0)
Logical Drive 1 Partition 1 [2222 MB] Map:(1.1.1)
Logical Drive 1 Partition 2 [2222 MB] Map:(1.1.2)
Logical Drive 3 RAID 0 [6000 MB]
Logical Drive 5 RAID 3 [8000 MB]
[Array Ch-0 : Id-14] SUN StorEdge 3310 A
[Array Ch-2 : Id-11] SEAGATE ST336605LSUN36G 34732 MB
[Array Ch-2 : Id-12] SEAGATE ST336605LSUN36G 34732 MB
[Array Ch-2 : Id-13] SEAGATE ST336605LSUN36G 34732 MB
[Primary] SUN StorEdge 3310 SN#666666

Selecting the container symbol to the left of any logical drive displays its assigned physical drives.

Note – You can choose to view the physical (hard) drives that make up the logical drives by selecting or deselecting View → Display HDD under LD.

Your configuration might differ dramatically from that shown in the previous figure depending on the array products you have installed.

If the array is not configured, see “Full Configuration” on page 65 for instructions on configuring it.

6. **Check the RAID level and logical drive structure.**

7. **If the arrays are already configured and the configuration meets your needs, continue with the next section.**

   If you would like to change the configuration, see “Full Configuration” on page 65.

▼ To Save the Logical Drive Configuration

Even though logical drive configuration information is stored on array controllers and on the physical drives attached to them, extreme circumstances, such as fire can occur, causing damage to both the controller and the drives. Keep multiple backup copies of your current logical drive (or LUN) configuration on diskette or some other form of external media other than the array. Keep at least one backup copy in a vault or secured location off site. A backup copy of the configuration enables you to restore the configuration to a new controller without having to completely reconfigure the array. If you do not have a backup copy of the current configuration, data could be lost.

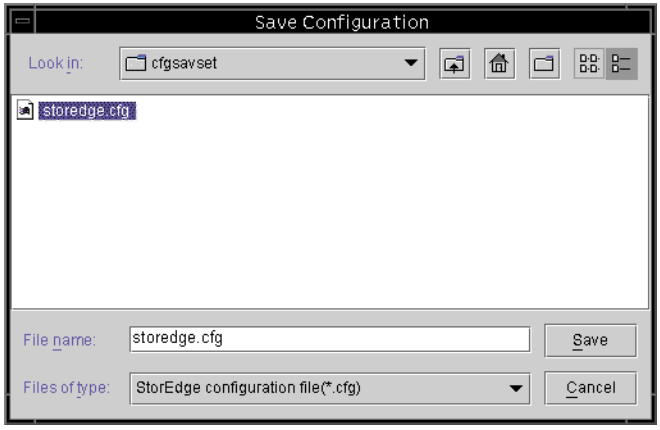
Always save your array controller configuration to a file whenever you:

- Install a new storage system enclosure or change the SCSI ID for the controller in an existing enclosure
- Replace an array controller
- Reconfigure or add logical drives to an array controller
- Rebuild the data from a failed drive to a standby drive

To restore a configuration from a file, see “To Restore a Logical Drive Configuration” on page 143.

1. **Select the controller with the configuration you want to save.**
2. **Select Configuration → Save Configuration.**

   The Save Configuration window is displayed.

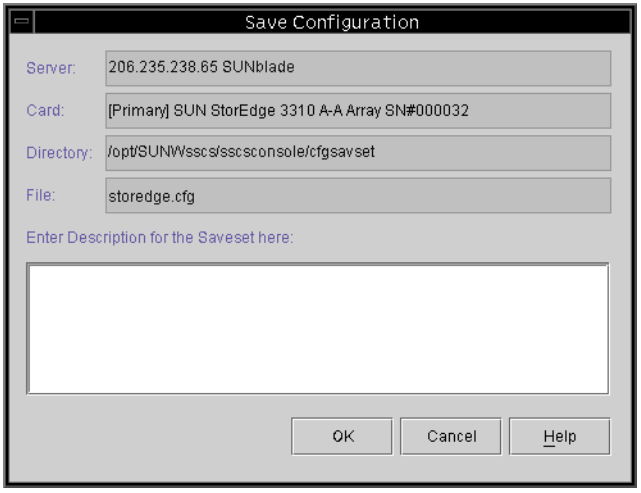


3. **Navigate to the required drive and folder to locate the configuration file(s) to be updated, indicated by a `.cfg` extension.**

   Save the file(s) to a diskette or a drive external to the array. That is, maintain copies of these configuration files off site.

4. **Specify the configuration file name and click Save.**

   The Save Configuration window is displayed.



5. **Type a description of the configuration you are saving and click OK.**

   The controller configuration information is saved to a `.cfg` file.

▼ To Create Partitions on a Server on a System Running the Solaris Operating Environment

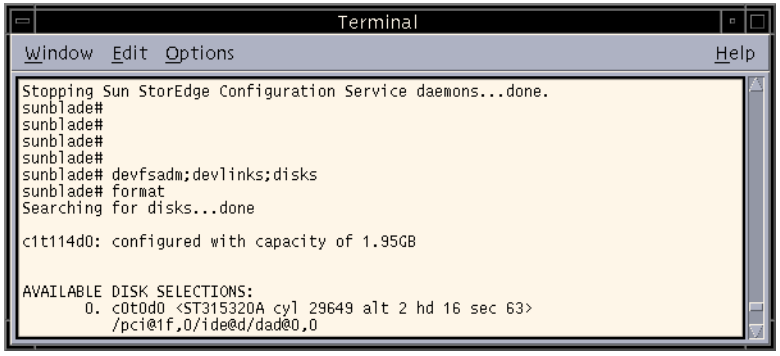
When you are satisfied with your storage configuration, you can partition the storage array for the operating environment.

The following steps are general guidelines. For detailed information, read about creating partitions and file systems in your Sun Solaris OE manual.

1. **Label a new LUN by typing**

```
# format
```

The `format` command displays the system disk as well as other drives attached to the array.



A new LUN must be labeled with the `format` command before it can be set up for use by the array. When the format command is initiated, the LUNs and hard disks that are available for use are displayed.

2. **Select the device to be used.**

   Label the device if prompted.

3. **Type the word partition to view the existing partition table.**

4. **Edit the partition table as necessary and label it if changes are made.**

5. **Create file systems on the partitions using the `newfs` command.**

6. **Mount the file systems by using the `mount` command or by editing `/etc/vfstab` and using the `mountall` command.**

▼ To Create Partitions on a Server on a Windows NT Operating System

Before starting this section, you need to restart the computer so that Windows NT recognizes the new storage capacity. The following steps are general guidelines; for detailed information, refer to your Windows NT documentation.

Note – This step cannot be done remotely. It must be performed at the server.

---

1. **Select Start → Programs → Administrative Tools → Disk Administrator.**
2. **Choose Yes in each of the Disk Administrator message boxes.**
3. **Select the logical drive by moving the cursor to the horizontal bar, and clicking the left mouse button.**
4. **Select Disk Administrator Partition → Create.**

   A prompt window is displayed, inquiring whether you want to create a partition that has a default capacity of the entire logical drive.
5. **If you want to create multiple partitions on a logical drive, enter the desired partition size.**

   Repeat this step until all the logical drive capacities are used.
6. **Select Disk Administrator Partition → Commit Changes Now.**

   This function enables you to format and use the logical drive without restarting the Windows NT operating system.
7. **Select the newly created logical drive partition.**
8. **Select Disk Administrator Tools → Format. Select the NTFS (NT File System) format.**

   Repeat Steps 7 and 8 to format each partition you created on the logical drive.
9. **When formatting is complete, close the Disk Administrator.**

▼ To Create Partitions on a Server on a Windows 2000 Operating System

The following steps are general guidelines; for detailed information, refer to your Windows 2000 documentation.

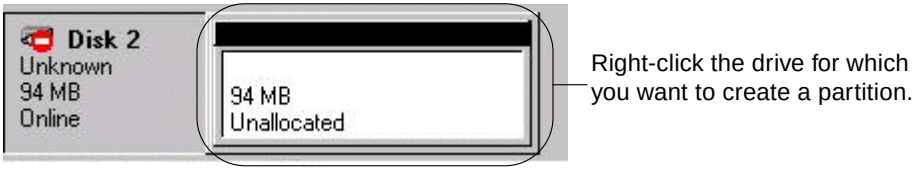
1. **Select Settings → Control Panel → Administrative Tools → Computer Management → Disk Management.**

   Make sure you can see the new drives marked by the disk icon under Disk Management.

2. **Right-click the disk for which you want to write a signature, and select Write Signature.**

3. **Select the disk for which you want to create a partition, and click OK.**

4. **Right-click the drive (where the drive capacity is shown), and select Create Partition.**



5. **Respond appropriately to the partition wizard prompts.**

What to Do Next

Sun StorEdge Configuration Service (console and agent) is now installed, set up, and ready to use. See the following chapters for additional tasks:

- "Monitoring the Array" on page 99, for information about how to use Sun StorEdge Configuration Service to monitor storage devices.
- "Maintaining the Array" on page 135, for information about maintaining the array. It includes detailed information about parity checking, scheduling parity checks, rebuilding failed drives, and restoring a configuration from a backup file.
- "Updating the Configuration" on page 151, when you want to update the configuration of the storage array. It also covers changing controller features, making or changing a standby drive, and editing the information for available servers.

CHAPTER 7

Full Configuration

Sun preconfigures logical drives on the array before shipment. Read this chapter only if the array is not already configured, or if you want to *completely* remove the existing configuration and start over. If you want to make changes to the existing configuration, see “Updating the Configuration” on page 151.

Full configuration includes the following topics:

- “Configuring Logical Drives and Logical Volumes” on page 66
  - “To Use Standard Configuration to Configure Logical Drives” on page 66
  - “To Use Custom Configuration to Configure Logical Drives and Logical Volumes” on page 69
  - “To Create and Partition a Logical Volume” on page 80
  - “To Clear a Configuration” on page 82
  - “To Log Out of the Configuration Level” on page 82
- “Host LUN Assignments” on page 83
  - “To Add (Map) a Host LUN” on page 83
  - “To Delete (Unmap) a Host LUN” on page 85
- “Configuration File” on page 85
  - “To Save a Configuration to a Backup File” on page 86

For the Sun StorEdge 3310 SCSI array, if you are planning to set up a cluster configuration, see “Using the Cluster Configuration (SCSI Only)” on page 219.

The Configuration menu commands and toolbar icons might be temporarily disabled if an array administration process, such as parity checking, is running. The menu command is also deactivated when the console is refreshing its inventory on the server. A satellite dish symbol is attached to the server icon during the refresh process.

Caution – Back up any existing data to an external device before configuring the array. Reconfiguration overwrites any existing logical drive configuration. When the existing logical drive configuration is overwritten, all data is effectively erased.

Configuring Logical Drives and Logical Volumes

Depending on whether you want to use one or multiple RAID levels, logical drives can be configured using Standard or Custom Configuration. Logical volumes are created using Custom Configuration only.

Note – On a Sun StorEdge 3310 SCSI array, you can create up to eight logical drives with up to 32 partitions per logical drive. There is a maximum of 128 LUN assignments. A logical volume can be divided into a maximum of 32 partitions. On a Sun StorEdge 3510 FC array, you can create up to eight logical drives with up to 128 partitions per logical drive. There is a maximum of 1024 LUN assignments (maximum number of LUNs assigned to each host ID is 32). A logical volume can be divided into a maximum of 128 partitions.

▼ To Use Standard Configuration to Configure Logical Drives

Use Standard Configuration Options to quickly configure all of the storage attached to an array controller using *one* RAID level. All you need to supply is the RAID controller, the optimization mode, and the RAID level. You also need to specify whether you want a standby drive. Sun StorEdge Configuration Service then automatically configures the storage for you, creating one or more logical drives, depending on the RAID level and the number of drives available. The write-back cache is selected by default. You are able to see the resulting configuration and accept or reject it before it is completed.

Caution – Back up any existing data to an external device before using Standard Configuration. Standard Configuration overwrites any existing logical drive configuration. When the existing logical drive configuration is overwritten, all data is effectively erased.

1. **Log in as an `ssconfig` user.**

2. **Select the desired RAID controller in the main window.**

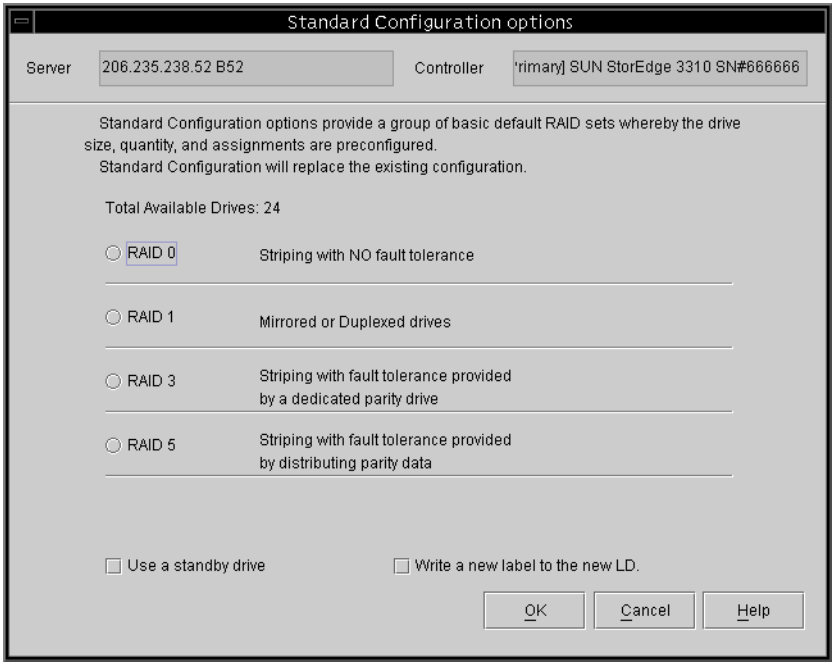
3. **Determine whether the optimization mode of the logical drive is to be Sequential I/O (default) or Random I/O. One optimization mode must be applied to all logical drives in an array. Your choice affects the maximum number of disks you can include in your array.**

   Optimization is set in the Cache tab of the Change Controller Parameters window. For more information on Sequential I/O and Random I/O, and for steps on how to set optimization, see “Cache Tab” on page 180.

4. **Select Configuration → Standard Configure.**

   A Standard Configuration Warning message is displayed. Click OK to continue.

   The Standard Configuration Options window is displayed. If you are not currently logged in as `ssconfig`, a login dialog is displayed.


Standard Configuration options
Server
206.235.238.52 B52
Controller
'rimary] SUN StorEdge 3310 SN#666666
Standard Configuration options provide a group of basic default RAID sets whereby the drive size, quantity, and assignments are preconfigured.
Standard Configuration will replace the existing configuration.
Total Available Drives: 24
RAID 0
Striping with NO fault tolerance
RAID 1
Mirrored or Duplexed drives
RAID 3
Striping with fault tolerance provided by a dedicated parity drive
RAID 5
Striping with fault tolerance provided by distributing parity data
Use a standby drive
Write a new label to the new LD.
OK
Cancel
Help

The options on the window might be disabled, depending on the number of drives available and whether you have a system running the Solaris operating environment or a Windows NT operating system on the server.

The NT Cluster option creates a quorum RAID 5 logical drive (100 Mbyte) and then allocates the remaining capacity over two large RAID 5 logical drives. For this option, three or more physical drives are required.

5. **Verify that the server and controller IDs displayed at the top of the window are correct.**

   If the server and the controller displayed at the top of the window are not correct, click Cancel to exit the configuration window and return to the main window. Select the appropriate device and select the window again.

6. **Indicate whether you want to use one of the drives as a standby drive.**

   When you select Use a standby drive, the program deactivates the RAID levels that do not use standby drives. (For example, RAID 0 has no fault tolerance; therefore, a standby drive provides no benefit.)

7. **From the RAID levels made available, select the appropriate RAID level for the logical drive you are configuring.**

   For definitions of the RAID levels, see “RAID Basics” on page 195.

   If you select RAID 3 or 5, Standard Configuration normally configures one large logical drive. However, if the array has more than 31 physical drives, more than one logical drive is created. Also, you need a minimum of three drives to use RAID 3 or 5.

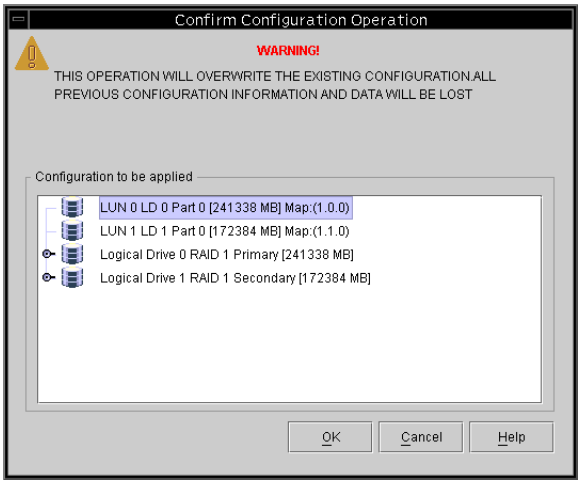
   If you select RAID 1, every logical drive requires at least two physical drives. If you select four or more drives, a logical drive with a RAID 1+0 is created.

   If you select RAID 0, if the array has more than 36 drives, more than one logical drive is created.

8. **(Solaris OE only). If you want the new logical drive to be automatically labeled, which enables the operating environment to use the drive, click Write a new label to the new LD.**

9. **After you select a RAID level, click OK.**

   The Confirm Configuration Operation window is displayed showing the new configuration.


Confirm Configuration Operation
WARNING!
THIS OPERATION WILL OVERWRITE THE EXISTING CONFIGURATION.ALL
PREVIOUS CONFIGURATION INFORMATION AND DATA WILL BE LOST
Configuration to be applied
LUN 0 LD 0 Part 0 [241338 MB] Map:(1.0.0)
LUN 1 LD 1 Part 0 [172384 MB] Map:(1.1.0)
Logical Drive 0 RAID 1 Primary [241338 MB]
Logical Drive 1 RAID 1 Secondary [172384 MB]
OK
Cancel
Help

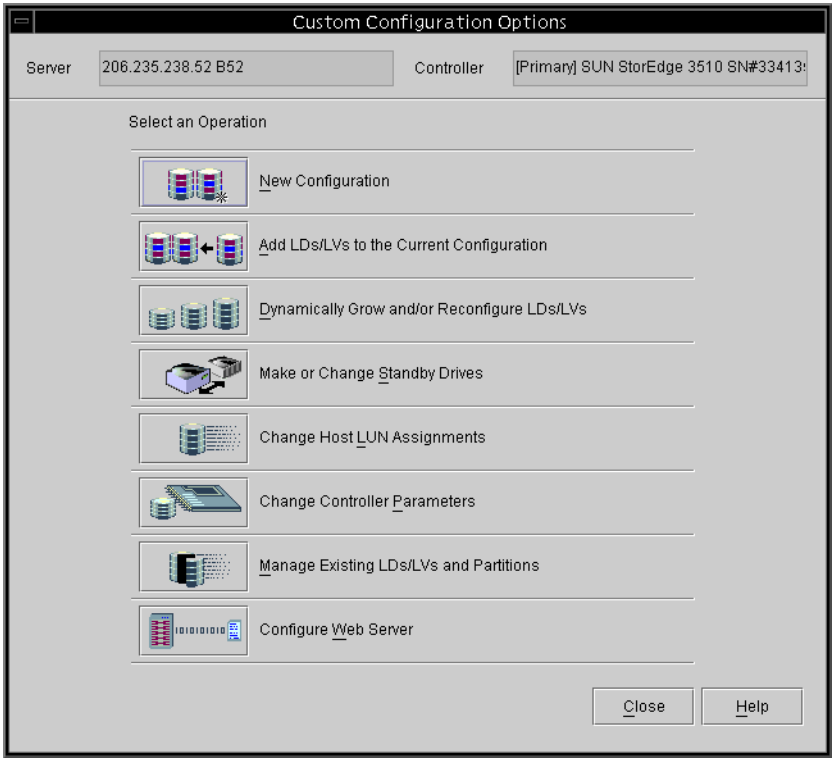
10. **Click OK to accept the configuration as indicated; otherwise, click Cancel to return to the console.**

▼ To Use Custom Configuration to Configure Logical Drives and Logical Volumes

Custom Configuration gives you multiple choices for configuring or reconfiguring logical drives with *varying* RAID levels and other RAID parameters. It also gives you the option of adding newly created logical drives to logical volumes.

1. **Log in as an `ssconfig` user.**
2. **Select the desired RAID controller in the main window.**
3. **Select Configuration → Custom Configure.**

   The Custom Configuration Options window is displayed.



- New Configuration – Configures new logical drives with varying RAID levels and other RAID parameters and enables you to add the new logical drives to logical volumes. The New Configuration command erases the previous configuration on an array controller.
- Add LDs/LVs to the Current Configuration – Adds new logical drives/logical volumes to an existing configuration. This command does not erase the other configured logical drives on the controller.
- Dynamically Grow and/or Reconfigure LDs/LVs – Enables you to expand the capacity of logical drives and logical volumes, add SCSI drives to existing logical drives and logical volumes, and copy and replace all member drives with drives of higher capacity.
- Make or Change Standby Drives – Adds one or more new standby drives to be associated with the array controller.
- Change Host LUN Assignments – Enables you to assign logical drives, logical volumes, and partitions to a host channel.
- Change Controller Parameters – Enables you to modify the controller parameters

- Manage Existing LDs/LVs and Partitions – Enables you to delete individual logical drives and logical volumes and create/delete partitions from existing logical drives and logical volumes.
- Configure Web Server (Sun StorEdge Enterprise Storage Manager Topology Reporter software required) – Enables you to configure a web server so you can manage/monitor an array through a web browser.

In this chapter, the New Configuration option is described in detail. Configure Web Server is described in "Managing Storage Through the Web" on page 132. The remaining options are described in "Updating the Configuration" on page 151.

The New Configuration Option

The New Configuration option enables you to customize the logical drive configuration to meet the specific needs of your environment. You can configure and partition one or more logical drives with varying RAID levels. You can then add two or more logical drives (unpartitioned) to a logical volume and divide the logical volume into a maximum of 32 partitions for SCSI and 128 partitions for Fibre Channel.

Note – On systems running the Solaris operating environment, if the console locks up during use, obtain the process number, and then close and reopen the window as described in "If Console Locks Up During Use" on page 39.

Before You Use New Configuration

Before you use New Configuration to create a logical drive or a logical volume for the first time, it is useful to familiarize yourself with the information contained in the following steps. Knowing this information ahead of time will ease the process of creating a logical drive or volume.

1. **Determine whether the optimization mode of the logical drive is to be Sequential I/O (default) or Random I/O. One optimization mode must be applied to all logical drives in an array. Your choice affects the maximum number of disks you can include in an array.**

   Optimization is set in the Cache tab of the Change Controller Parameters window. For more information on Sequential I/O and Random I/O, and for steps on how to set optimization, see "Cache Tab" on page 180.

2. **Determine the total number of physical disks to be included in the logical drive, which is dependent on the optimization mode selected.**

   If the security of your data is important, leave remaining disks for standby drives.

   For information on the maximum number of disks and maximum usable capacity per logical drive for random and sequential optimization, see "Maximum Number of Disks and Maximum Usable Capacity for Random and Sequential Optimization" on page 181.

Note – If the logical drive is going to be larger than 253 Gbyte, see "To Prepare for Logical Drives Larger Than 253 Gbyte" on page 73.

---

3. **Determine whether any standby (spare) drives will be local or global.**

   A standby drive is a drive that is marked as a spare to support automatic data rebuilding after a physical drive associated with a logical drive fails. For a standby drive to take the place of another drive, it must be at least equal in size to the failed drive. Also, the failed drive itself must be from a RAID 1, 3, or 5.

   A local spare drive is a standby drive assigned to serve one specified logical drive. When a member drive of this specified logical drive fails, the local spare drive becomes a member drive and automatically starts to rebuild.

   A global spare drive does not only serve one specified logical drive. When a member drive from any of the logical drives fail, the global spare drive joins that logical drive and automatically starts to rebuild.

4. **Determine the RAID level; the program automatically computes the maximum size logical drive that can be created at that RAID level.**

5. **Determine whether you want to partition the logical drive.**

   A *partition* is a logical division of the logical drive (or logical volume). Partitions enable you to create the appearance of having separate logical drives (or logical volumes) for file management, multiple users, or other purposes.

Note – Partitioning can be done during the initial configuration or after the logical drive has been created.

Note – Logical drives that have been partitioned cannot be added to a logical volume.

---

6. **Understand the disk capacities displayed in the New Configuration window.**

   - Max Drive Size (MB) – displays the maximum drive size per selected physical disk (total capacity of each disk).

     A smaller logical drive can be created by decreasing this value. The remainder can be used later by expanding the drive (as explained in "To Expand the Capacity of a Logical Drive or Logical Volume" on page 163).
   - Available Size (MB) – displays the total capacity of all disks, which is the total logical drive or logical volume size.

Note – The maximum usable capacity for a logical drive is equal to the smallest physical disk size. For example, if you add an 18-Gbyte disk and then add a 70-Gbyte disk to be part of the logical drive, the maximum usable capacity is 18 Gbyte per drive.

---

7. **Determine whether the logical drive is to be part of a logical volume.**

Note – Logical drives that have been partitioned cannot be added to a logical volume.

---

8. **Determine whether you want to partition the logical volume.**

Note – Partitioning can be done during the initial configuration or after the logical volume has been created.

---

9. **Determine the background rate, which is the percentage of available array controller CPU time assigned to array administration activities, such as rebuilding drives, checking parity, and initialization.**

   If the background rate is set to 100%, the array administration activities have a higher priority than any other system activity. At 0%, the array administration activity is done only if there is no other activity on the array controller.

▼ To Prepare for Logical Drives Larger Than 253 Gbyte

The Solaris operating environment requires drive geometry for various operations, including `newfs`. In order for the appropriate drive geometry to be presented to the Solaris operating environment for logical drives larger than 253 Gbyte, you have to configure Host Cylinder / Head / Sector Mapping Configuration using the firmware application. Refer to the *Sun StorEdge 3000 Family RAID Firmware User's Guide* for your array for information about accessing the firmware application.

1. **In the firmware application, select view and edit Configuration parameters on the Main menu.**

2. **Select Host-Side SCSI Parameters.**
3. **Select Host Cylinder/Head/Sector Mapping Configuration.**
4. **Select Sector Ranges and specify 255.**
5. **Select Head Ranges and specify 64.**
6. **Select Cylinder Ranges and specify <65536.**

▼ To Create and Partition a Logical Drive Using New Configuration

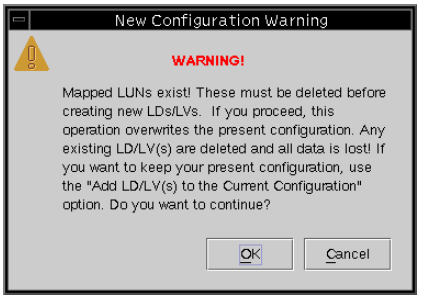
Before you create and partition a logical drive using New Configuration for the first time, it is useful to review the steps under “Before You Use New Configuration” on page 71.

The following steps provide a working example of creating a new configuration for a new logical drive. Three logical drives are selected and configured into a RAID 5 logical drive. A small logical drive is then created and partitioned.

Caution – Back up any existing data to an external device before using the New Configuration command. Sun StorEdge Configuration Service automatically initializes new logical drives defined on the array controller.

1. **Log in as an `ssconfig` user.**
2. **Select the desired RAID controller in the main window.**
3. **Select Configuration → Custom Configure.**
4. **Click New Configuration.**

   The New Configuration Warning message box is displayed.


New Configuration Warning
WARNING!
Mapped LUNs exist! These must be deleted before creating new LDs/LVs. If you proceed, this operation overwrites the present configuration. Any existing LD/LV(s) are deleted and all data is lost! If you want to keep your present configuration, use the "Add LD/LV(s) to the Current Configuration" option. Do you want to continue?
OK
Cancel

5. **Click OK.**

6. **Verify that the Server and Controller displayed at the top of the window are correct.**

   If the server and the controller displayed are not correct, click Cancel to exit the New Configuration window and return to the main window. Select the appropriate disk controller and reselect New Configuration.

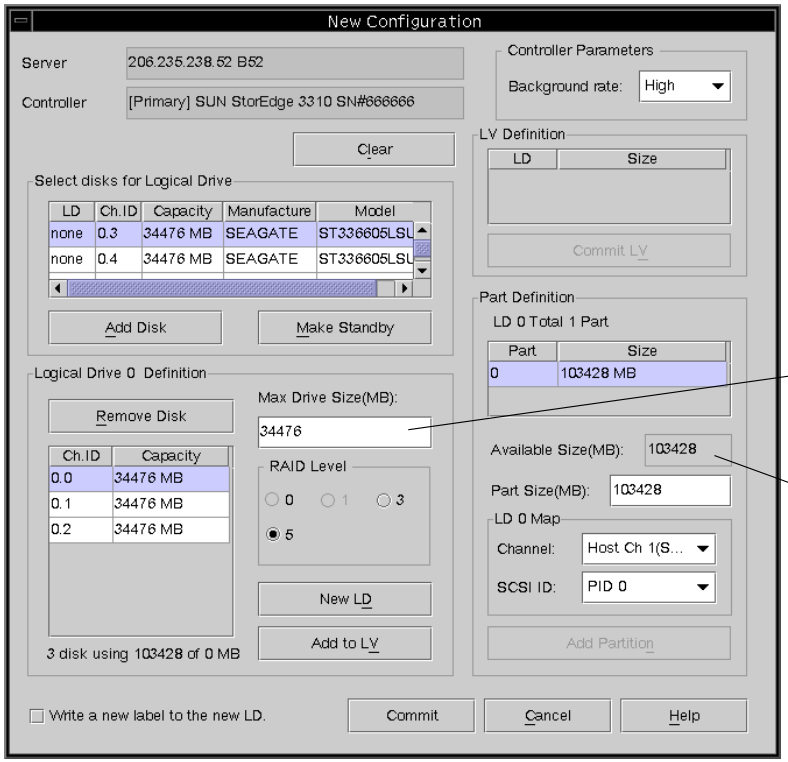
7. **Set the Background Rate for the controller, if desired.**

8. **In the Select disks for Logical Drive list box, select the first disk and click Add Disk.**

   Proceed to add the next two disks so that three disks are displayed in the lower list box.

   If you make a mistake or change your mind, select the drive from the drives list and click Remove Disk.

Note – Because the logical drive has not been partitioned yet, the Part Size (MB) and the Available Size (MB) are equal. A single logical drive is considered to be a single partition.



9. Select the RAID Level. For this example, select RAID Level 5.

This applies to all disks in this logical drive.

In this example, the new logical drive is composed of three physical disks, totaling 103428 Mbyte, as indicated in the Available Size (MB) field.

The maximum number of disks per logical drive for each RAID level for a 2U array is:

- RAID 0 - 36
- RAID 1 - 2
- RAID 1+ 0 - 36
- RAID 3 or 5 - 31

For RAID 1, note that if you select four or more drives, a logical drive with a RAID 1+0 is created.

10. Set the Max Drive Size.

The Max Drive Size displays the total capacity of each disk. A smaller logical drive can be created by decreasing this value.

Note – If you do not change the Max Drive Size but you do change the Partition Size, a new partition is created at the specified partition size. The remaining logical drive size capacity moves to the last partition. Remaining capacity can be used later by expanding the drive (as explained in “To Expand the Capacity of a Logical Drive or Logical Volume” on page 163). The drive capacity is no longer editable after a partition is created.

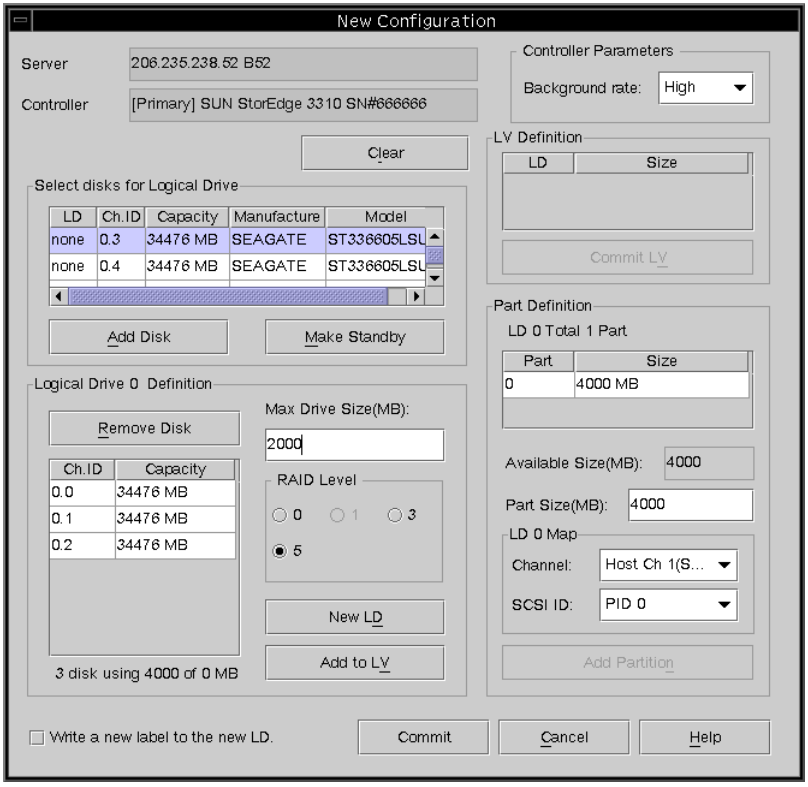
11. **Select the Host channel and SCSI ID to which you would like the new logical drive to be mapped to from the Channel and SCSI ID list boxes.**

Note – If you do not want to map the logical drive at this time, select Do Not Map from the Channel list box.

Note – On a Sun StorEdge 3310 SCSI array, you can create up to eight logical drives with up to 32 partitions per logical drive. There is a maximum of 128 LUN assignments. A logical volume can be divided into a maximum of 32 partitions. On a Sun StorEdge 3510 FC array, you can create up to eight logical drives with up to 128 partitions per logical drive. There is a maximum of 1024 LUN assignments (maximum number of LUNs assigned to each host ID is 32). A logical volume can be divided into a maximum of 128 partitions.

12. **This step depends on what you want to do next:**
    - To create another logical drive, click New LD and repeat Steps 1-11.
    - To add this logical drive to a logical volume, click Add to LV and see “To Create and Partition a Logical Volume” on page 80.
    - To partition this logical drive, continue with the following steps. In this example, a small logical drive is created and partitioned.
13. **To create a small logical drive, type 2000 in the Max Drive Size field.**

Note – A total of 4000 Mbyte is shown for the logical drive size as opposed to 6000 Mbyte; because this is a RAID 5 level, you lose the capacity equal to 1 drive (2000 Mbyte) for parity.



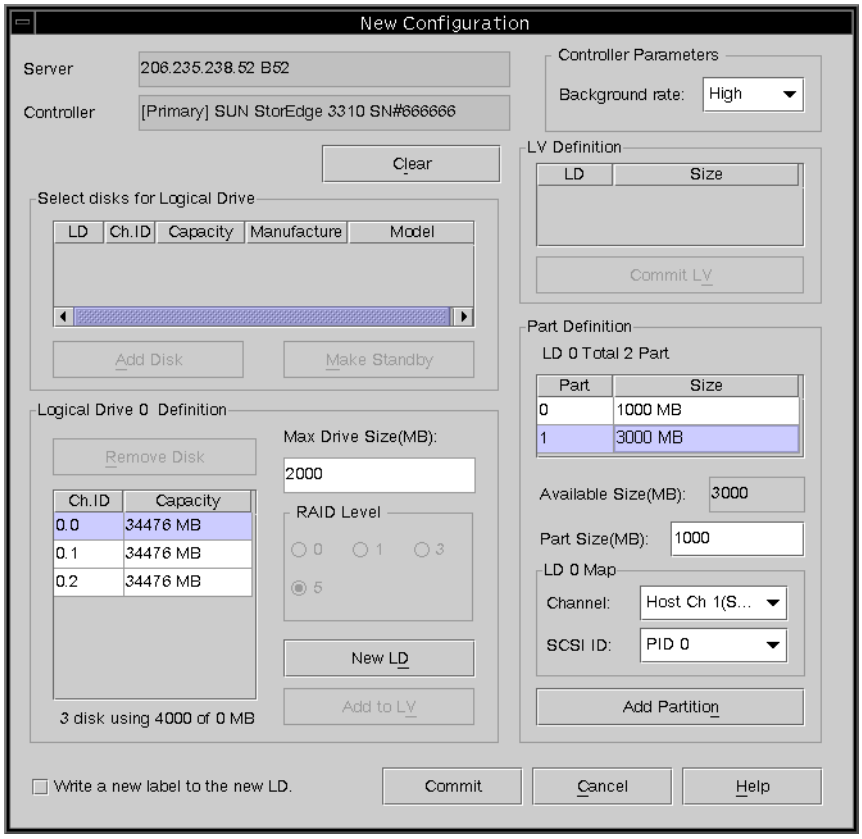
14. To create a partition, type 1000 in the Part Size field and click Add Partition.

Note – Do not partition a logical drive if you plan on adding it to a logical volume. Once a logical drive is partitioned, it cannot be added to a logical volume.

To create multiple partitions of the same size, click Add Partition as many times as partitions you want to create. You can also type the partition size in the Part Size field and multiply (*) it by the number of partitions you want to create, for example 100*128. Any remaining MB is added to the last partition.

As you add partitions, the remaining capacity displayed in Available Size (MB) decreases by the amount of the partition size.

As shown in the following example, of the original 4000 Mbyte, 1000 Mbyte was allocated to Partition 0. The remaining 3000 Mbyte is then automatically moved to Partition 1. The remaining usable capacity is displayed in the Available Size (MB) field.



15. **(Solaris OE only). If you want the new logical drive to be automatically labeled, which enables the operating environment to use the drive, click Write a new label to the new LD.**

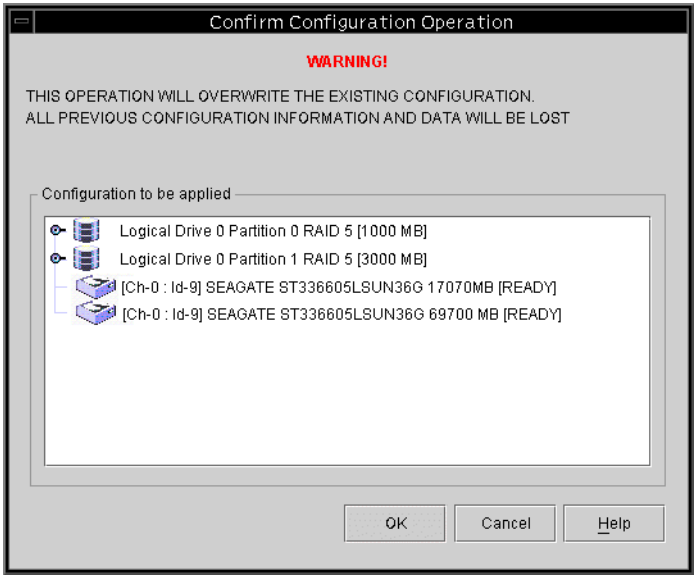
16. **Click Commit to end the configuration of the logical drive or New LD to configure another logical drive.**

    When you click New LD, any available disks that haven't been used are displayed.

    When the logical drive configuration for this array is complete, click Commit**,** and then click OK. The completed configuration is displayed.

Note – You cannot change a logical drive configuration after you click OK.

Note – During initialization, LD/LV size is displayed as 0 Mbyte.


Confirm Configuration Operation
WARNING!
THIS OPERATION WILL OVERWRITE THE EXISTING CONFIGURATION.
ALL PREVIOUS CONFIGURATION INFORMATION AND DATA WILL BE LOST
Configuration to be applied
Logical Drive 0 Partition 0 RAID 5 [1000 MB]
Logical Drive 0 Partition 1 RAID 5 [3000 MB]
[Ch-0 : Id-9] SEAGATE ST336605LSUN36G 17070MB [READY]
[Ch-0 : Id-9] SEAGATE ST336605LSUN36G 69700 MB [READY]
OK
Cancel
Help

▼ To Create and Partition a Logical Volume

A logical volume is composed of two or more logical drives and can be divided into a maximum of 32 partitions for SCSI and 128 for Fibre Channel. During operation, the host sees a nonpartitioned logical volume or a partition of a logical volume as one single physical drive.

1. **Create a logical drive as described in Steps 1-11 in "To Create and Partition a Logical Drive Using New Configuration" on page 74.**

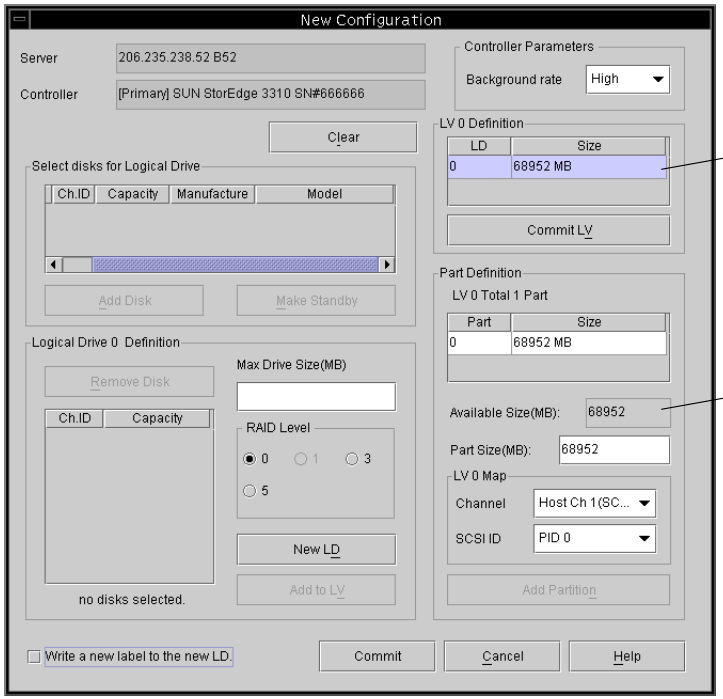
Note – Do not partition the logical drive that you are adding to the logical volume. A logical drive that has been partitioned cannot be added to a logical volume.

---

2. **Before you click Commit, to add the logical drive to a logical volume, click Add to LV.**

   The logical drive is added to the LV Definition box. The total size of the logical volume is displayed in the Available Size (MB) field.

Note – Because the logical volume has not been partitioned yet, the Part Size (MB) and the Available Size (MB) are equal. A single logical volume is considered to be a single partition.



As logical drives are added to the logical volume, they are displayed in the LV Definition box

Available Size – displays the total capacity of all disks, which is the total logical volume size

3. **To create another logical drive to add to the logical volume, click New LD.**
4. **Create the logical drive and add it to the logical volume by clicking Add to LV.**

   Repeat this step for every logical drive you want to add to the logical volume.
5. **To create a partition, type the partition size in the Part Size field and click Add Partition.**

   To create multiple partitions of the same size, click Add Partition as many times as partitions you want to create. You can also type the partition size in the Part Size field and multiply (*) it by the number of partitions you want to create, for example 100*128.

   As you add partitions, the remaining capacity displayed in Available Size (MB) decreases by the amount of the partition size.
6. **When you have finished adding logical drives to the logical volume, to create another logical volume or an individual logical drive, click Commit LV.**

   When you are finished creating logical volumes and do not want to create an individual logical drive, click Commit.

Note – When you have finished creating logical volumes and want to exit the New Configuration window, if you accidentally click Commit LV instead of Commit, you will have to create another logical drive; otherwise, you have to click Cancel and configure the logical volume again.

To add or delete a logical volume to or partition a logical volume in an existing configuration, see “Updating the Configuration” on page 151.

▼ To Clear a Configuration

If at any time during the configuration process in the New Configuration window you are dissatisfied with the configuration, you can clear it.

1. **Click Clear to remove all physical and logical drives from the display.**
2. **Either click New LD to define a new logical drive, or click Commit.**
3. **When you click Commit, a warning prompt is displayed; click OK.**

   Sun StorEdge Configuration Service initializes the entire configuration on the selected array controller.

Note – Host LUNs are automatically mapped after logical drives have completed the initialization process.

▼ To Log Out of the Configuration Level

When you have finished with configuration activities, log back in to the monitoring level of the program.

1. **Select File → Logout.**
2. **Select Logout to monitoring mode and click OK.**

Host LUN Assignments

For the server to recognize a logical drive/logical volume, it must first be mapped to a host channel/ID. When a logical drive/logical volume is mapped to a host channel/ID, it becomes a LUN. The following section describes how to map a logical drive/logical volume to a host channel and how to remove it.

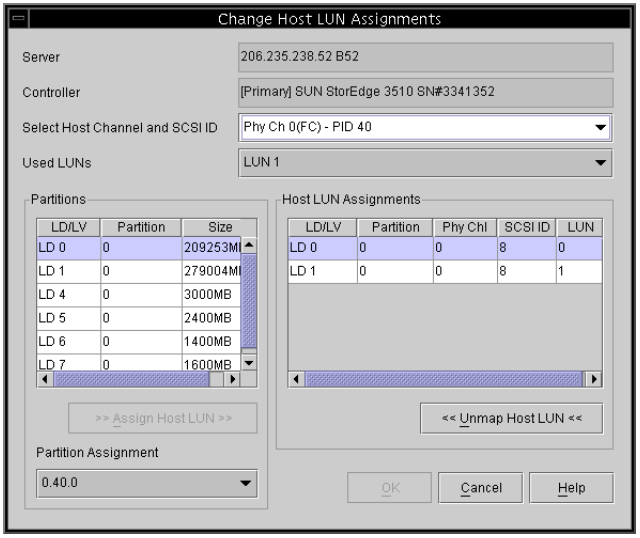
Note – When logical drives/logical volumes are first created, unless Do Not Map is selected, the host LUNs are automatically mapped after logical drives/logical volumes have completed the initialization process.

Note – On a Sun StorEdge 3310 SCSI array, you can create up to eight logical drives with up to 32 partitions per logical drive. There is a maximum of 128 LUN assignments. A logical volume can be divided into a maximum of 32 partitions. On a Sun StorEdge 3510 FC array, you can create up to eight logical drives with up to 128 partitions per logical drive. There is a maximum of 1024 LUN assignments (maximum number of LUNs assigned to each host ID is 32). A logical volume can be divided into a maximum of 128 partitions.

▼ To Add (Map) a Host LUN

1. **Select Configuration → Custom Configure.**
2. **Select Change Host LUN Assignments.**

The Change Host LUN Assignments window is displayed.



3. **Using the Select Host Channel and SCSI ID list box, select the channel and ID to which the LUN is to be assigned.**

   All available LUNs are displayed under Partitions. For your reference, Used LUNs displays a list of LUNs used for a specified channel and Partition Assignment displays a list of channels, IDs, and LUNs to which a partition has been assigned.

Note – When a logical drive / logical volume is added or created, it is assigned as either primary or secondary (controller assignment). A logical drive / logical volume is then initialized and mapped to a primary or secondary channel ID. If you unmap a logical drive / logical volume and remap it to another host channel ID that has a different controller assignment, *you must reset the controller.* If you unmap a logical drive / logical volume and remap it to another host channel ID that has the *same* controller assignment, you do not have to reset the controller. If a logical drive / logical volume has remaining partitions still mapped, the unmapped partitions can only be mapped to host channel IDs of the same controller assignment.

---

4. **Select the desired partition from the LDs/LVs field, and click Assign Host LUN to accept the change.**

   To map multiple partitions (up to 32), select the first partition, scroll to the last partition and Shift-click to select everything in between. Then click Assign Host LUN**.**

   As a result, Delete Host LUN becomes active.

5. **When finished, click OK to save your changes and to return to the main menu.**

Note – In the event that an error message is displayed when mapping a host channel, repeat Steps 1 through 5.

▼ To Delete (Unmap) a Host LUN

1. **With the Change Host LUN Assignments window displayed, select the LUN to be deleted from the Host LUN Assignments field.**
2. **Click Delete Host LUN.**
3. **When finished, click OK to save your changes and to return to the main menu.**

Configuration File

Keep a backup copy of the current configuration on diskette or on an external device other than the array. Even though configuration information is stored on array controllers and on the physical drives attached to them, circumstances such as a fire or a flood can occur, causing damage to both the controller and the drives. A backup copy of the configuration enables you to restore the configuration to a new controller without having to completely reconfigure the storage array.

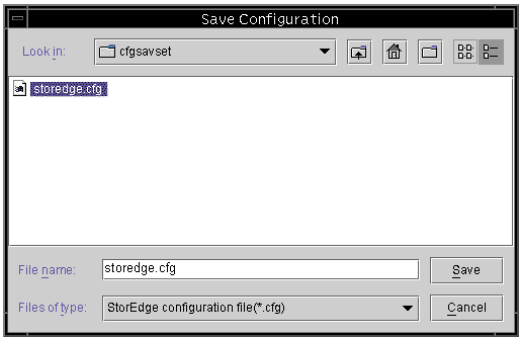
Always save the array controller configuration to a file whenever you:

- Install a new storage system enclosure or change the SCSI ID for the controller in an existing enclosure
- Replace an array controller
- Reconfigure or add logical drives to a array controller
- Rebuild the data from a failed drive to a standby drive

▼ To Save a Configuration to a Backup File

1. **Select the controller with the configuration you want to save.**
2. **Select Configuration → Save Configuration.**

   The Save Configuration window is displayed.

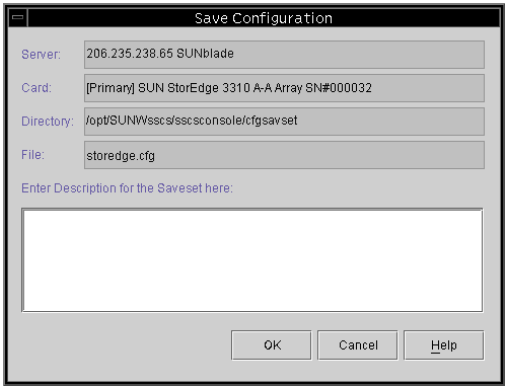


3. **If necessary, navigate to the drive and folder where you want the configuration file to be saved.**

   Save the file to a diskette or a drive external to the array.

4. **Specify the configuration file name and click Save.**

   The Save Configuration window is displayed.



5. **Type a description of the configuration you are saving.**
6. **Click OK.**

   The controller configuration information is saved to a `.cfg` file.

Loading the Configuration

If a drive or controller is damaged and needs to be replaced, see “To Restore a Logical Drive Configuration” on page 143, which describes how to load a configuration file and restore a logical drive configuration.

CHAPTER 8

LUN Filtering (Fibre Channel Only)

This chapter explains how to create a LUN filter for the Sun StorEdge 3510 Fibre Channel array to maintain large Fibre Channel networks that share common storage. Topics covered in this chapter include:

- "Overview" on page 89
- "Assigning a LUN Filter" on page 91
  - "To Access the LUN Filter View" on page 91
  - "To Add HBA Devices Manually" on page 92
  - "To Remove Standard Host Mapping" on page 94
  - "To Map Logical Drives to Hosts" on page 95
  - "To Delete a LUN Filter" on page 98

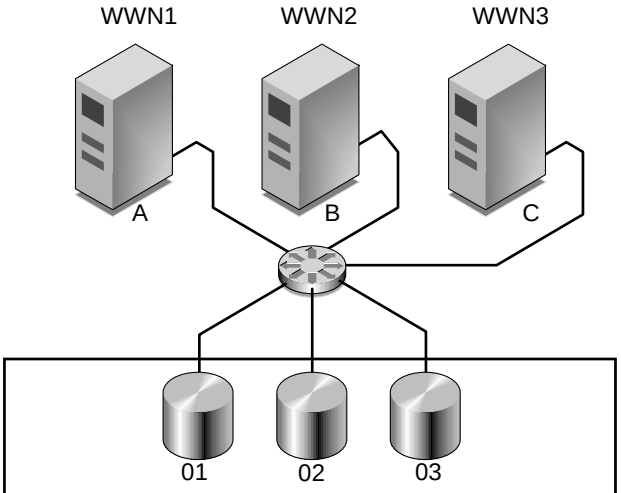
Overview

An important part of effectively maintaining a storage infrastructure depends on how accessible and secure the data is at all times. With LUN filtering support, Sun StorEdge Configuration Service provides a utility for secure centralized storage access management.

For multiple servers connected to the same array, LUN filtering provides an exclusive path from a server to a logical drive and essentially hides or excludes the other connected servers from seeing or accessing the same logical drive. That is, the LUN filter organizes how the array devices are accessed and viewed from host devices, and typically maps an array device to only one host so that other hosts do not access and use the same array device. LUN filtering also enables multiple logical drives or partitions to be mapped to the same LUN number allowing different servers to have their own LUN 0 to boot from, if needed. LUN filtering is also valuable in clarifying mapping when each HBA typically sees twice the number of logical drives when viewed through a hub.

Each Fibre Channel device is assigned a unique identifier called a worldwide name (WWN). A WWN is assigned by the IEEE and is similar to a MAC address in IP or a URL on the Internet. These WWNs stay with the device for its lifetime. LUN filtering uses this WWN to specify which server is to have exclusive use of a specific logical drive. An easy drag-and-drop method is used to map each logical drive to a host's Fibre Channel HBA card, identified with a WWN.

As shown in the following example, when you map LUN 01 to host channel 0 and select WWN1, server A has a proprietary path to that logical drive. All servers continue to see and access LUN 02 and LUN 03 unless filters are created on them.



WWN	LUN ID	LUN ID	LUN ID
(1) 210000E08B021D15	01	XX	XX
(2) 210000E08B02DE2F	XX	02	XX
(3) 210000E08B22DE2F	XX	XX	03

FIGURE 8-1 Example of LUN Filtering

An advantage of LUN filtering is that it allows many more hosts like Windows NT to attach to an array through a common Fibre Channel port and still maintain LUN security.

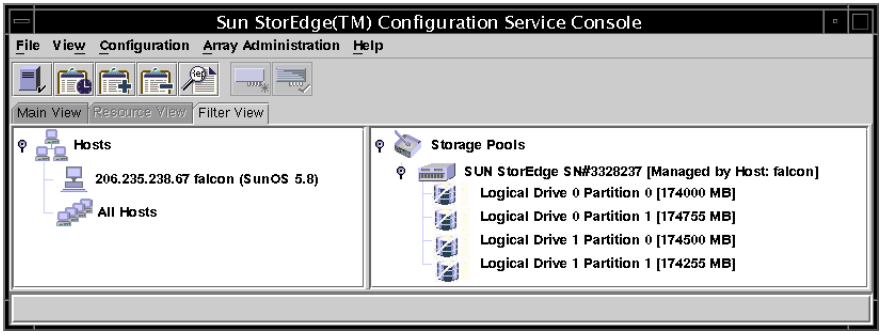
Assigning a LUN Filter

Assigning a LUN filter involves the following steps:

- Access the LUN Filter window
- Add HBA device manually (if you do not see the desired HBA)
- Remove standard mapping
- Map logical drives to hosts

▼ To Access the LUN Filter View

1. **Access the LUN Filter View by clicking the Filter View tab.**
2. **Click the container symbol to expand the device trees and view the servers in detail on the left and the array devices in detail on the right.**

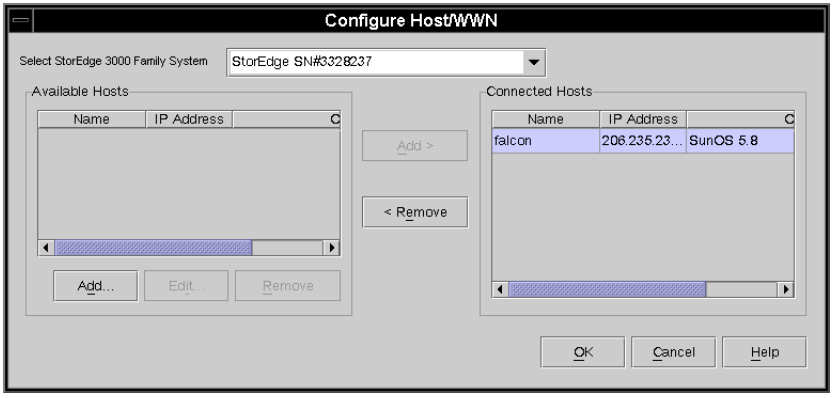

Sun StorEdge(TM) Configuration Service Console
File View Configuration Array Administration Help
Main View
Resource View
Filter View
Hosts
206.235.238.67 falcon (SunOS 5.8)
All Hosts
Storage Pools
SUN StorEdge SN#3328237 [Managed by Host: falcon]
Logical Drive 0 Partition 0 [174000 MB]
Logical Drive 0 Partition 1 [174755 MB]
Logical Drive 1 Partition 0 [174500 MB]
Logical Drive 1 Partition 1 [174255 MB]

▼ To Add HBA Devices Manually

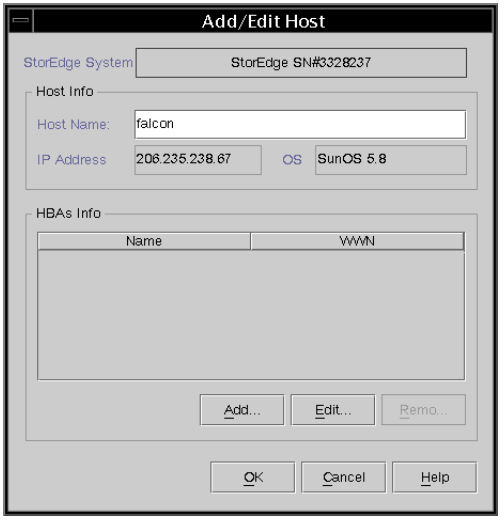
If you do not see the desired HBA device under the Hosts displayed, add it manually through the Configure Host/WWN window.

1. **Select Configuration → Configure Host/WWN.**
2. **In the Available Hosts list, select the host that has the HBA device to be added, and click Edit.**

   If the host is under the Connected Hosts list, select the host and click Remove to place the host under the Available Hosts list.

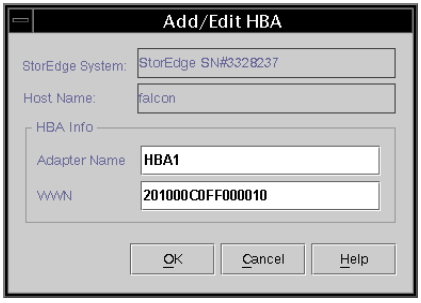


3. **In the Add/Edit Host box, click Add.**



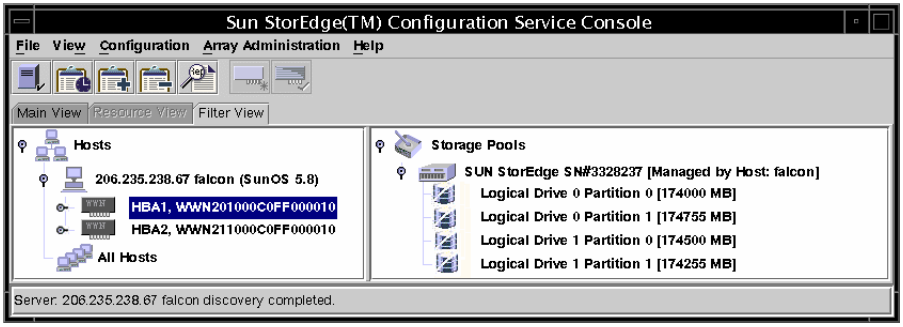
4. **In the next Add/Edit HBA box, enter the new Adapter Name and the appropriate WWN, and click OK.**

   For details on determining the WWN, see “Determining Host Worldwide Names (Fibre Channel Only)” on page 225.



5. **In the Configure Host/WWN window, select the edited host, and click Add to move the edited host to the Connected Hosts list, and click OK.**

   When you return to the LUN Filter view, the new HBA device is gray and is available for LUN filtering.


Sun StorEdge(TM) Configuration Service Console
File View Configuration Array Administration Help
Main View
Resource View
Filter View
Hosts
206.235.238.67 falcon (SunOS 5.8)
HBA1, WWN201000C0FF000010
HBA2, WWN211000C0FF000010
All Hosts
Storage Pools
SUN StorEdge SN#3328237 [Managed by Host: falcon]
Logical Drive 0 Partition 0 [174000 MB]
Logical Drive 0 Partition 1 [174755 MB]
Logical Drive 1 Partition 0 [174500 MB]
Logical Drive 1 Partition 1 [174255 MB]
Server: 206.235.238.67 falcon discovery completed.

▼ To Remove Standard Host Mapping

Standard mapping allows all hosts to see all standard mapped logical drives. LUN filtering restricts the mapping to specific host(s). Before you can assign a LUN filter, you have to remove the standard host mapping (indicated by M labels) from the array.

1. **Click each All Hosts item, and drag and drop it to Storage Pools.**
2. **Click OK to the following message**:

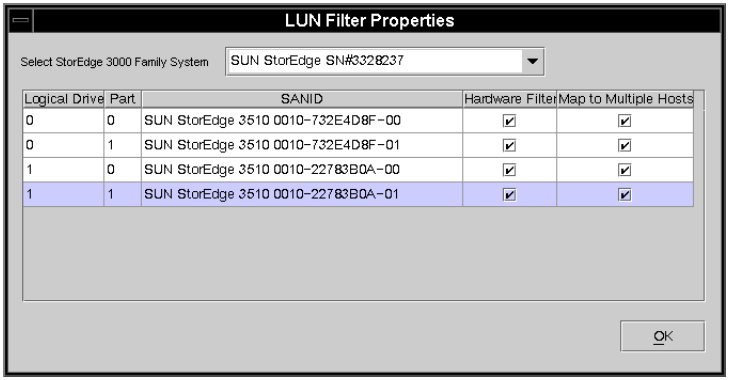
```
Operation will delete all standard maps of Logical Drive X
Partition X. Do you want to continue?
```

A message confirming the successful deletion of the standard host LUN mapping is displayed.

3. **If the host is not the primary agent for an array and you want to map the device to that host, select the device, and select Configuration → Configure Host/WWN.**
4. **Select the desired host from the Available Hosts list, and click Add to add the host to the Connected Hosts list.**

   A message is displayed to confirm the addition of the host server.
5. **Click Close to save the configuration information and exit the window.**
6. **If you want to map multiple hosts to an array, select Configuration → LUN Filter Properties, and then select the array from the pulldown menu.**
7. **Select the Hardware Filter and Map to Multiple Hosts check boxes, and click OK.**

Note – If you deselect the Hardware Filter check box, you cannot create a filter mapping; you can only create a standard map.



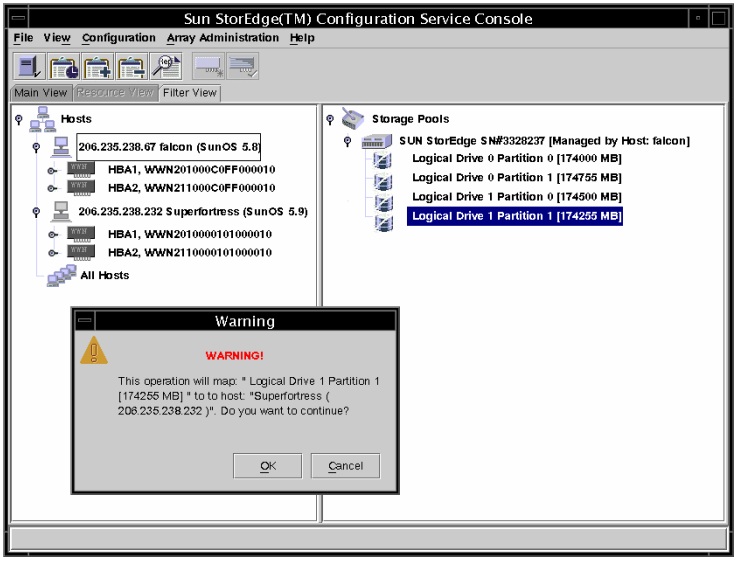
▼ To Map Logical Drives to Hosts

1. **Make sure you are still in the LUN Filter view; if not, click the Filter View tab.**
2. **Select a logical drive from Storage Pools, and drag and drop it to the appropriate HBA card under Hosts.**

   If the HBA card connected to the array is not known, drag and drop the logical drive to the host.

   The program prompts you to filter the array for each HBA card in the host (which means that it is visible to the HBA card attached to it and does not appear for the other HBA cards).

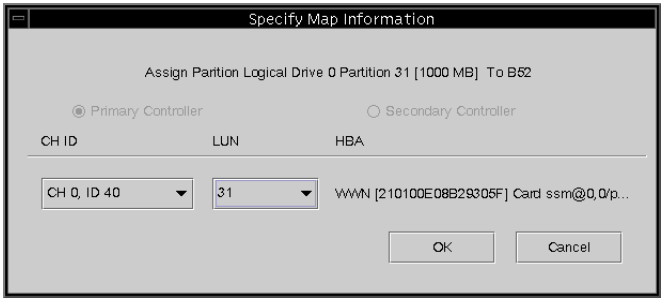
3. **When the prompt is displayed to confirm the mapping, click OK.**


Sun StorEdge(TM) Configuration Service Console
File View Configuration Array Administration Help
Main View Resource View Filter View
Hosts
206.235.238.67 falcon (SunOS 5.8)
HBA1, WWN201000C0FF000010
HBA2, WWN211000C0FF000010
206.235.238.232 Superfortress (SunOS 5.9)
HBA1, WWN2010000101000010
HBA2, WWN2110000101000010
All Hosts
Storage Pools
SUN StorEdge SN#3328237 [Managed by Host: falcon]
Logical Drive 0 Partition 0 [174000 MB]
Logical Drive 0 Partition 1 [174755 MB]
Logical Drive 1 Partition 0 [174500 MB]
Logical Drive 1 Partition 1 [174255 MB]
Warning
WARNING!
This operation will map: " Logical Drive 1 Partition 1 [174255 MB] " to to host: "Superfortress (206.235.238.232)". Do you want to continue?
OK
Cancel

The Specify Map Information window is displayed. Note that the program automatically maps the logical drive to the first HBA card listed in the host if there is more than one HBA card.

4. **Assign the logical drive to a primary or secondary controller and with the desired channels and LUN ID numbers, and then click OK.**

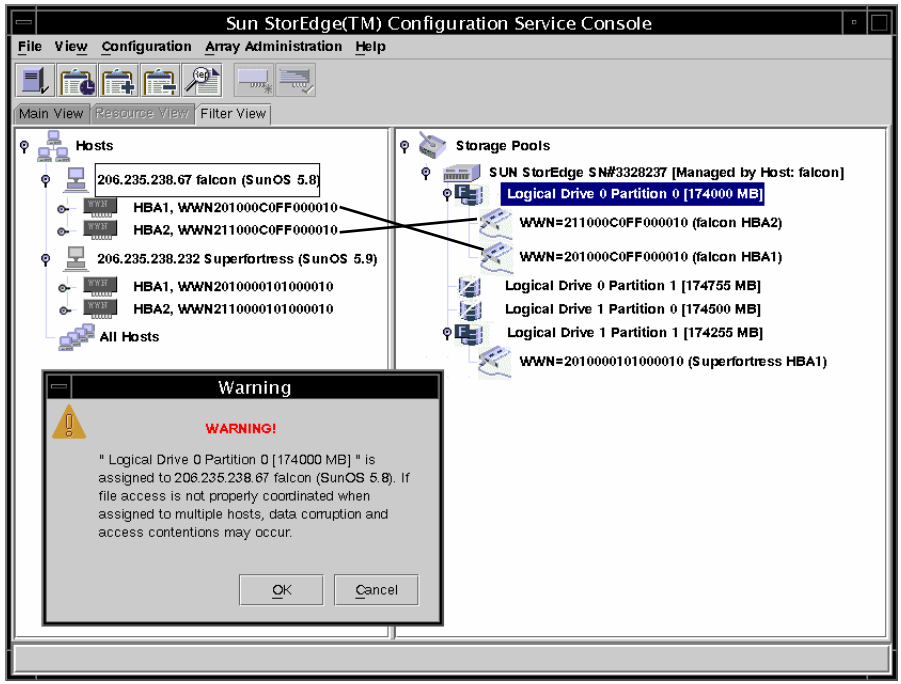
   The assignment of the primary controller or secondary controller to an HBA card is selected for the initial LUN filter assignment, and cannot be changed unless you delete the LUN filter assignment and start over.



To apply a LUN filter to a second host for one array, repeat Step 6 under “To Add HBA Devices Manually” on page 92 through Step 3 under “To Map Logical Drives to Hosts” on page 95.

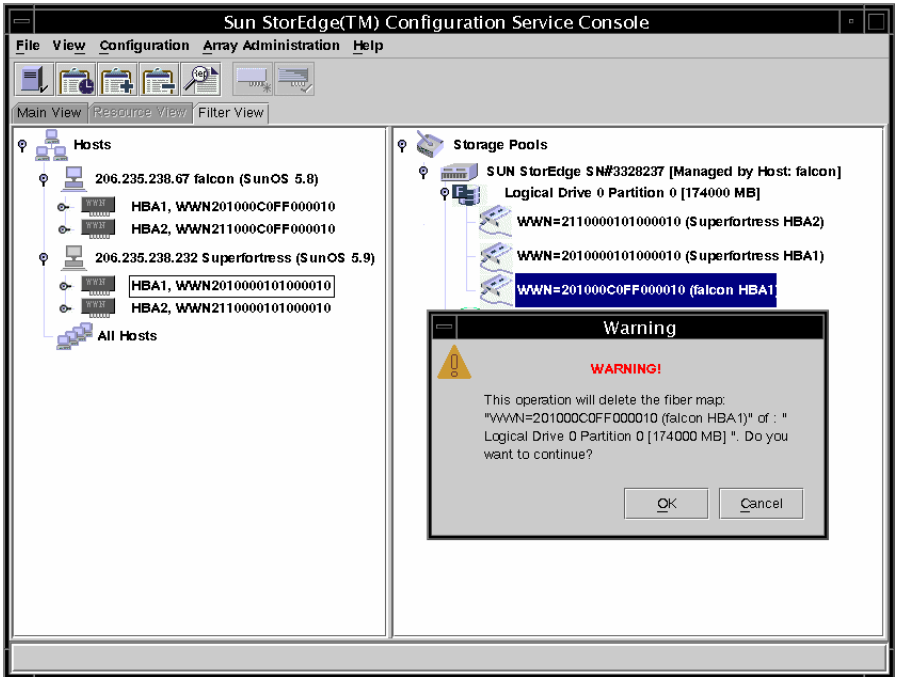
A warning prompt is displayed informing you that two users accessing the same logical drive at the same time may cause data corruption; click OK to add the additional host.

In the following example, the Sun StorEdge 3510 Fibre Channel device has LUN filters (note the letter F for filter) to two separate hosts.


Sun StorEdge(TM) Configuration Service Console
File View Configuration Array Administration Help
Main View Resource View Filter View
Hosts
206.235.238.67 falcon (SunOS 5.8)
HBA1, WWN201000C0FF000010
HBA2, WWN211000C0FF000010
206.235.238.232 Superfortress (SunOS 5.9)
HBA1, WWN2010000101000010
HBA2, WWN2110000101000010
All Hosts
Storage Pools
SUN StorEdge SN#3328237 [Managed by Host: falcon]
Logical Drive 0 Partition 0 [174000 MB]
WWN=211000C0FF000010 (falcon HBA2)
WWN=201000C0FF000010 (falcon HBA1)
Logical Drive 0 Partition 1 [174755 MB]
Logical Drive 1 Partition 0 [174500 MB]
Logical Drive 1 Partition 1 [174255 MB]
WWN=2010000101000010 (Superfortress HBA1)
Warning
WARNING!
" Logical Drive 0 Partition 0 [174000 MB] " is assigned to 206.235.238.67 falcon (SunOS 5.8). If file access is not properly coordinated when assigned to multiple hosts, data corruption and access contentions may occur.
OK
Cancel

▼ To Delete a LUN Filter

1. **Select the associated WWN.**
2. **Drag and drop it to Storage Pools.**
3. **When the prompt to confirm the deleted mapping is displayed, click OK.**
4. **When the second confirmation is displayed, click OK.**



CHAPTER 9

Monitoring the Array

This chapter explains how to monitor the array using Sun StorEdge Configuration Service. It describes the main window and the component view windows that are available when an icon is double-clicked in the main window. It also explains how the Event Log works and how to use the reporting function. It is organized into the following sections:

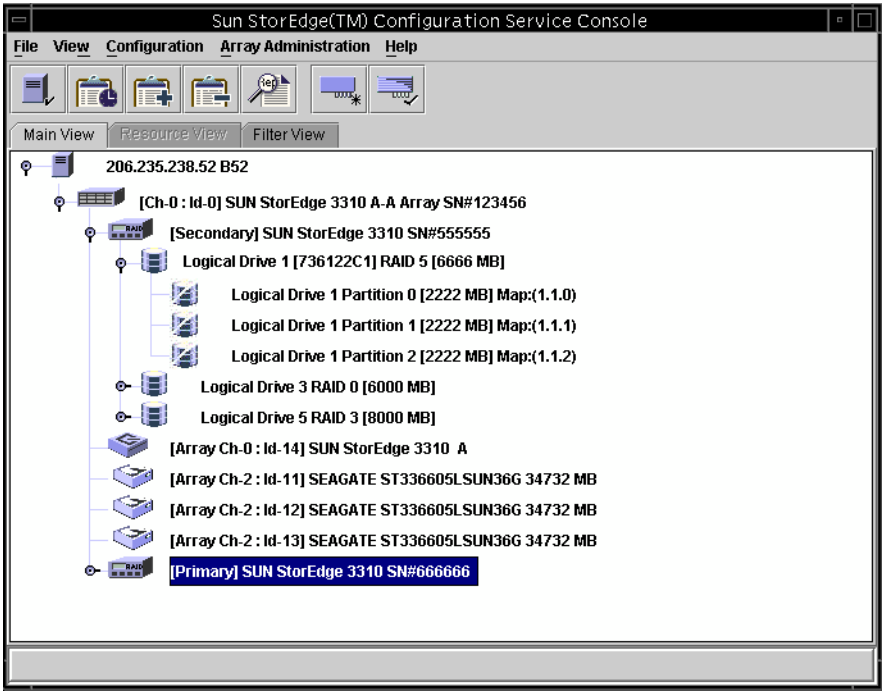
- "The Main Window" on page 99
- "Viewing Detailed Device Information" on page 106
- "Event Log" on page 120
- "Save Report" on page 124
- "View Report" on page 127
- "Out-of-Band Storage Management" on page 127
- "Managing Storage Through the Web" on page 132

The Main Window

The main window provides *status at a glance* for all array devices. It indicates the status of the devices and logical drives connected to servers monitored by the console. The devices include array controllers, disk storage enclosures, physical disk drives, and other SCSI devices.

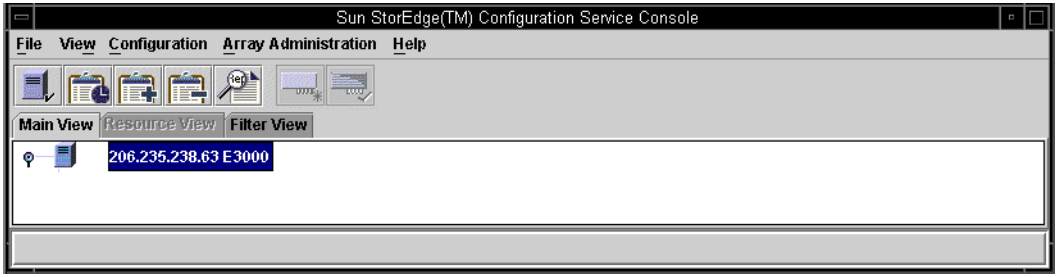
This window's tree structure offers detail for all devices connected to each server. The or container symbol at the left side of the tree indicates whether the display of devices is expanded or collapsed. The container symbol means that you can click to display more devices. The container symbol indicates that all devices at and below that level are shown.

The following figure shows an example of the expanded view of the main window.


Sun StorEdge(TM) Configuration Service Console
File View Configuration Array Administration Help
Main View Resource View Filter View
206.235.238.52 B52
[Ch-0 : Id-0] SUN StorEdge 3310 A-A Array SN#123456
[Secondary] SUN StorEdge 3310 SN#555555
Logical Drive 1 [736122C1] RAID 5 [6666 MB]
Logical Drive 1 Partition 0 [2222 MB] Map:(1.1.0)
Logical Drive 1 Partition 1 [2222 MB] Map:(1.1.1)
Logical Drive 1 Partition 2 [2222 MB] Map:(1.1.2)
Logical Drive 3 RAID 0 [6000 MB]
Logical Drive 5 RAID 3 [8000 MB]
[Array Ch-0 : Id-14] SUN StorEdge 3310 A
[Array Ch-2 : Id-11] SEAGATE ST336605LSUN36G 34732 MB
[Array Ch-2 : Id-12] SEAGATE ST336605LSUN36G 34732 MB
[Array Ch-2 : Id-13] SEAGATE ST336605LSUN36G 34732 MB
[Primary] SUN StorEdge 3310 SN#666666

Note – The SN# represents the unique ID of the array.

The following figure shows an example of a collapsed view.


Sun StorEdge(TM) Configuration Service Console
File View Configuration Array Administration Help
Main View Resource View Filter View
206.235.238.63 E3000

For more information, you can double-click an icon to open a component view window. The component views are covered later in this chapter.

Another feature of the main window is that device states are color-coded and symbol-coded so that it is easy to identify when a device is in a state that requires attention. The status is propagated along the device tree, enabling you to trace a failure down to the device level. See TABLE 9-1 for device status details.

TABLE 9-1 Device Status State

Color	Symbol	State
Purple	None	The group, server, or device is online.
White	None	The user has not logged into this server.
Yellow		One or more components of this group or server are not working properly, but the array is still functional. For example, a logical drive that has one failed physical drive is operating in a degraded state.
Red		One or more components of this group or server are not working. A logical drive with two failed disk drives or an enclosure with three failed fans would be in a critical state.
Gray		The group, server, or device is unresponsive.

Online Help

To access online help, select Help → Contents. The online help is in HTML format and can be run through Internet Explorer or Netscape. It includes information about major functions within the program.

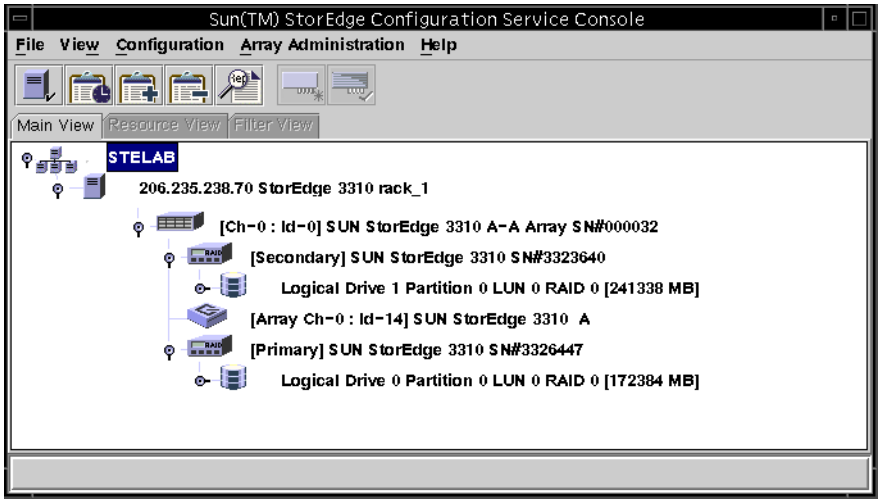
Tree View of Product Configurations

For each server (or group of servers), devices in the tree view are arranged in a hierarchical order with the server (or group) at the top, followed by the array controllers. How the remaining devices — logical drives, physical drives, and enclosures — are shown might vary slightly, depending on which array and controller are being displayed. This section provides window views that might be depicted in the tree view.

Groups

A *group* is a logical collection of servers within the device tree. This new data object enables multiple servers to be contained under a single category.

The group object looks and behaves like all tree objects. It has an iconic representation and generally assumes the status of its servers. The following figure shows the group icon expanded to show the subordinate or underlying server objects.


Sun(TM) StorEdge Configuration Service Console
File View Configuration Array Administration Help
Main View
Resource View
Filter View
STELAB
206.235.238.70 StorEdge 3310 rack_1
[Ch-0 : Id-0] SUN StorEdge 3310 A-A Array SN#000032
[Secondary] SUN StorEdge 3310 SN#3323640
Logical Drive 1 Partition 0 LUN 0 RAID 0 [241338 MB]
[Array Ch-0 : Id-14] SUN StorEdge 3310 A
[Primary] SUN StorEdge 3310 SN#3326447
Logical Drive 0 Partition 0 LUN 0 RAID 0 [172384 MB]

A group is a new data object that enables multiple servers to be contained under a single category. Groups are similar in concept to domains. They enable you to organize servers. Instead of a linear tree of all the managed servers, you can organize the servers into like sets or groups.

Groups are color-coded and symbol-coded similarly to servers. States with their corresponding colors have the following order of precedence:

- Critical – red (the highest)
- Nonresponding – gray
- Degraded – yellow
- Optimal – purple
- Not logged into – white

A server icon assumes the color of the highest state of any of its storage system. Likewise, a group icon takes on the highest state of any of its servers, with the following exceptions involving non responding or unlogged servers.

When a group icon is disabled (inactive), it indicates that all the servers attached to that group are not responding; if any number less than all of the servers in the group is not responding, the group icon appears red, representing a critical state. For example, if there are four servers in the group and three or fewer servers are not responding, the group icon is color-coded red.

When a group icon is color-coded white (not logged in), it indicates that one or more servers within that group have not yet been fully configured, or could represent a period of status transition. TABLE 9-2 gives an example of the different color coding of a two-server group.

TABLE 9-2 Two-Server Group Colors

Server 1 Icon Color	Server 2 Icon Color	Group Icon Color
Gray	Gray	Gray (not responding)
Gray	Yellow, Red, Purple, or White	Red (critical)
White	White	White (not logged into)
White	Yellow	Yellow (degraded)
White	Red	Red (critical)
White	Purple	Purple (optimal)
Red	Any Color	Red (critical)
Yellow	Yellow or Purple	Yellow (degraded)
Purple	Purple	Purple (optimal)

Groups are not required. You can configure the program for no groups and fifteen servers, for example, or for one group with ten servers underneath, with an additional five at the top level. The program enables any combination.

The number of groups permitted and the number of servers within a group is limited only by available system memory. If a server is a member of a group and a user deletes that group from the group list box, servers are reassigned in that group to the no group category. The tree is remapped in the main window.

The Monitoring Process

The console monitors storage devices on a network by communicating with an agent on the servers.

When the program is started, the console software begins by establishing contact with the agent on each managed server if Auto Discovery was specified when the server was configured. If Auto Discovery was not specified, you have to double-click each server and provide a password to start the discovery process for that server.

Establishing a TCP/IP connection between the console and the agent on each server and receiving back inventory information can take several minutes, depending on the complexity of the network. When this is occurring, the server icon in the main window displays a satellite dish icon on its right side. Once the inventory is refreshed, the satellite dish symbol is replaced by an active server symbol.

The agent on each server does a periodic scan of its inventory to check for changes. If there is a change, the agent sends an event to the console. Depending on the event, the console might request the inventory from that server's last scan to use for updating the representation of the server as displayed on the main window. During this process, the satellite dish icon is attached to the server icon, and you cannot do any configuration and array activity commands on that server until the refresh process is completed and the console main window is updated.

When the program is running and the server agent and console are connected, the agent pings or transmits a periodic signal to the console to verify the server's status. If the console does not receive a certain number of consecutive responses (handshakes) from the agent, the console marks the server as offline and disconnects from the server. The server's icon is made inactive and adjacently marked with a question mark symbol.

If a nonactive server was originally made active through the Auto Discovery function, the console periodically tries to reestablish server communications.

Occasionally, you might want to have an inventory performed on a server between the periodic status scans. To do this, double-click the server's icon to display the Server View window, and then click Rescan in that window.

Auto Discovery Options

If you have selected the Auto Discovery option (during the process of adding servers to the Managed Servers list, see “Select or Deselect Automatic Discovery of servers:” on page 45), the program automatically scans and performs an inventory on these servers. You are not required to provide a monitoring password to retrieve information provided by the program. Depending on the complexity of the network and the number of servers, it can take several minutes for the discovery process to finish.

However, if you choose not to use the Auto Discovery option on startup, the servers' icons are white, indicating that there is currently no information available for these servers. In this case, you need to double-click each server icon and specify the appropriate monitoring password.

You can also select File → Login. Once the password is specified for a server, the discovery process begins to perform an inventory on the selected server.

Note – If you need a very secure environment where access to server inventory data is restricted, select No for Auto Discovery (see “Select or Deselect Automatic Discovery of servers:” on page 45).

Viewing Detailed Device Information

Sun StorEdge Configuration Service provides detailed information about each agent or server and about the array devices that are connected to it. The fields on each of these views vary, depending on the capabilities of the disk controller.

Except for Save Report and View Report, which are located under the File menu, the commands and windows described in this section are accessed through the View menu.

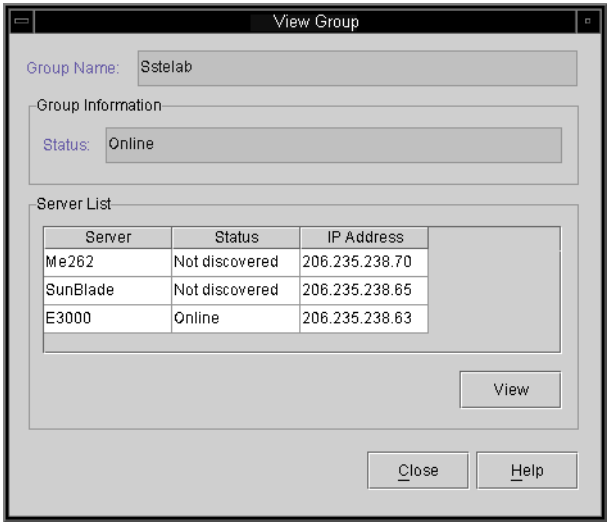
- View Group
- View Server
- View Controller Configuration
- View Logical Drive
- View Physical Drive
- View Enclosure
- View FRU
- Array Administration Progress
- Agent Options Management
- Save Report
- View Report

View Group

View Group displays the servers that make up the group that is selected in the main window.

To access View Group, double-click the group icon in the main window or select the group icon and select View → View Group.

The Server List displays all servers that are attached to the specified group.

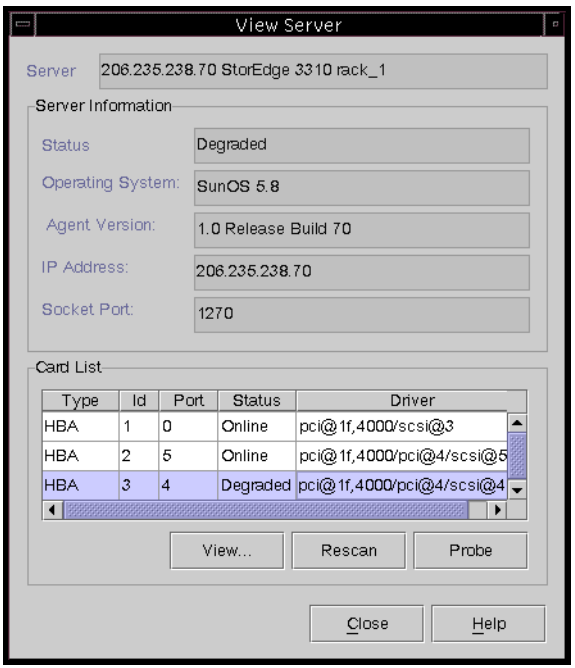


To view more information about any of the servers listed, select the appropriate status record in the list and click View, or double-click the status record. A window describing the corresponding server is displayed.

View Server

View Server displays the characteristics of the server that is selected in the main window.

To access View Server, double-click the server icon in the main window or select the server icon and select View → View Server.



Note – Dual-port HBAs are displayed as separate entries because they have separate channels to which devices can be connected.

Part of the TCP/IP network, the socket port makes a connection between the server and the client.

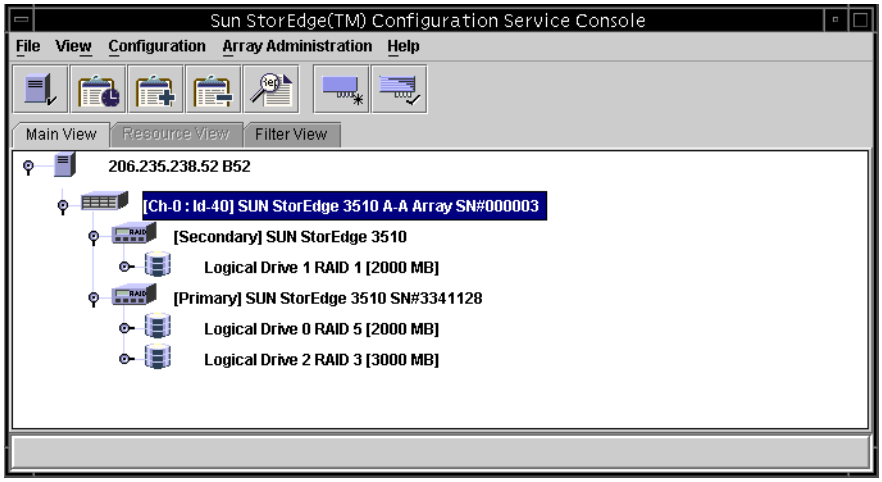
- Rescan – sends a command to the selected server to rescan existing inventory and refresh the console. Normally, each managed server performs a periodic scan of its inventory and updates the console if there is a change. If you want to perform a diagnostic of all assigned devices, click Rescan; selecting this button essentially circumvents the periodic and automatic status updates.

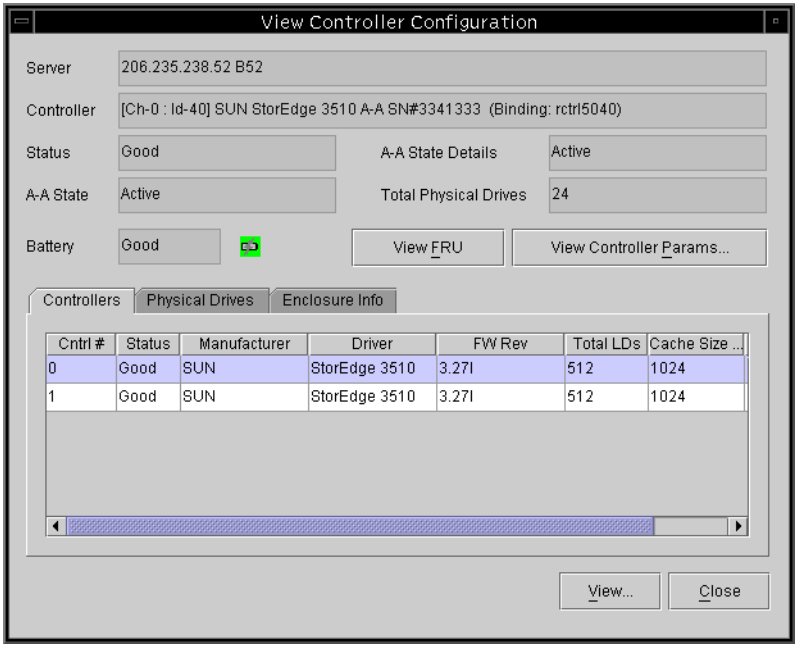
- Probe – sends a command to the selected server to probe for new inventory (for example, RAID controllers, JBODs, and expansion units). Whenever a new device has been added, or a device name has changed and you want it to be displayed in the main window tree view immediately, click Probe.
- Card List – displays host adapters and array controllers that are installed in or connected to the specified server. To view more information about any of the host adapters or array controllers listed, select the appropriate record in the list and click View, or double-click the selected status record. A window describing the corresponding host adapter or array controller is displayed.

View Controller Configuration

View Controller Configuration displays the components that make up the array.

To access View Controller Configuration, double-click the array icon in the main window, or select it and select View → View Controller.


Sun StorEdge(TM) Configuration Service Console
File View Configuration Array Administration Help
Main View
Resource View
Filter View
206.235.238.52 B52
[Ch-0 : Id-40] SUN StorEdge 3510 A-A Array SN#000003
[Secondary] SUN StorEdge 3510
Logical Drive 1 RAID 1 [2000 MB]
[Primary] SUN StorEdge 3510 SN#3341128
Logical Drive 0 RAID 5 [2000 MB]
Logical Drive 2 RAID 3 [3000 MB]



If the battery fails, the array displays a yellow (degraded) device status symbol in the main window, and the Battery field specifies Bad.

The tabs at the bottom section of the window provide detailed information about the RAID controller's LUNs, on the physical drives attached to it, on the enclosure where the controller is located, and on the configuration of the peripherals. To bring the information for another tab into view, click the tab.

Controllers Tab

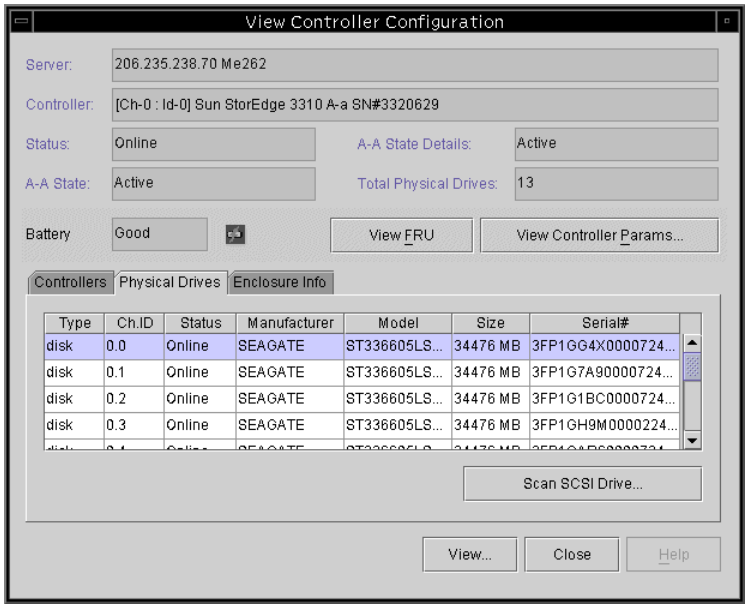
To access this window, double-click the array icon in the main window, or select it and select View → View Controller. Then click the Controller tab.

The Controller tab lists the two controllers. To view more information about either of the controllers, double-click the desired controller or select the controller and click View**.** Depending on whether the controller is primary or secondary, the View Primary or View Secondary Controller Configuration window is displayed. See "View Primary / Secondary Controller Configuration" on page 113.

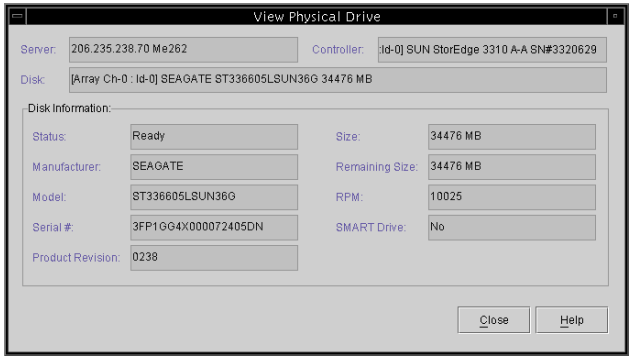
Physical Drives Tab

To access this window, double-click the array icon in the main window, or select it and select View → View Controller. Then click the Physical Drives tab.

The following figure shows the View Controller Configuration with the Physical Drives tab displayed.



The Physical Drives tab lists the physical drives associated with the array. To see details about any of the physical drives listed, double-click the drive or select the drive and click View. The View Physical Drive window is displayed.



For more information about View Physical Drive, see “View Physical Drive” on page 116.

Enclosure Info Tab

To access this window, either double-click the Enclosure icon in the main window, or select the array icon and select View → View Controller. Select the Enclosure Info tab. Select an enclosure and click View.

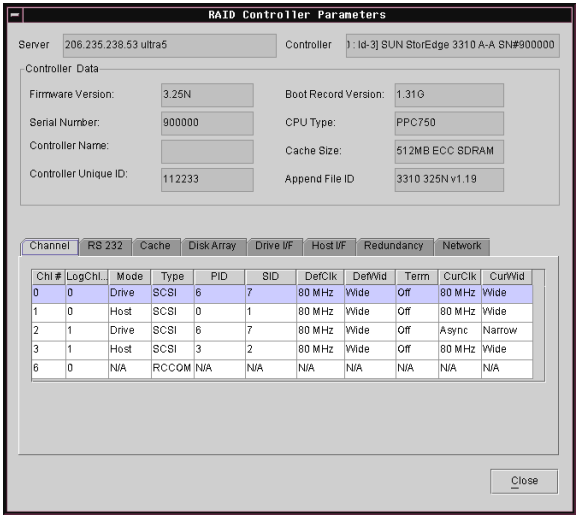
The information in the Enclosure Info tab includes the status of the power supplies, fans, and the enclosure temperature. For more information about View Enclosure, see “View Enclosure” on page 117.

View FRU

For the Sun StorEdge 3310 SCSI array only, to display the field-replaceable unit identification (FRU ID) information for the array, click View FRU. For example FRU ID information, see “View FRU” on page 119.

View Controller Parameters

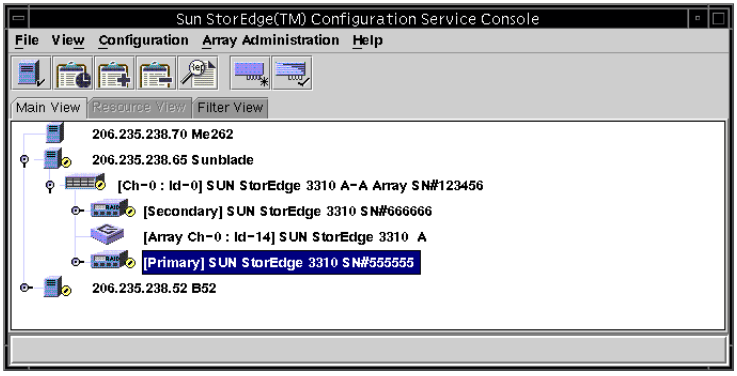
Click View Controller Parameters to view detailed information about Channels, RS 232, Cache, Disk Array, Drive I/F, Host I/F, and Redundancy. To view the information, click the tab that corresponds to the item you want to view. To change controller parameters, see “To Change Controller Parameters” on page 175.

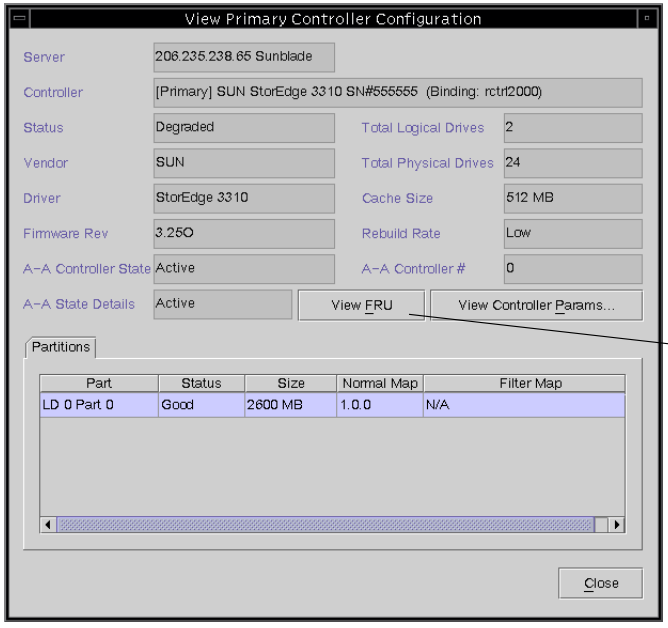


View Primary / Secondary Controller Configuration

View Primary and View Secondary Controller Configuration windows display the characteristics of the RAID controller that is selected in the main window. To display the primary controller characteristics, select the primary controller from the main window and select View → View Controller, or double-click the primary controller.

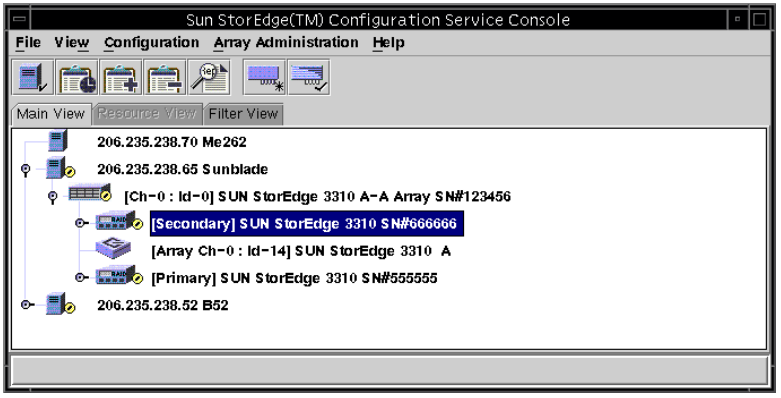
The following two examples show the primary controller.

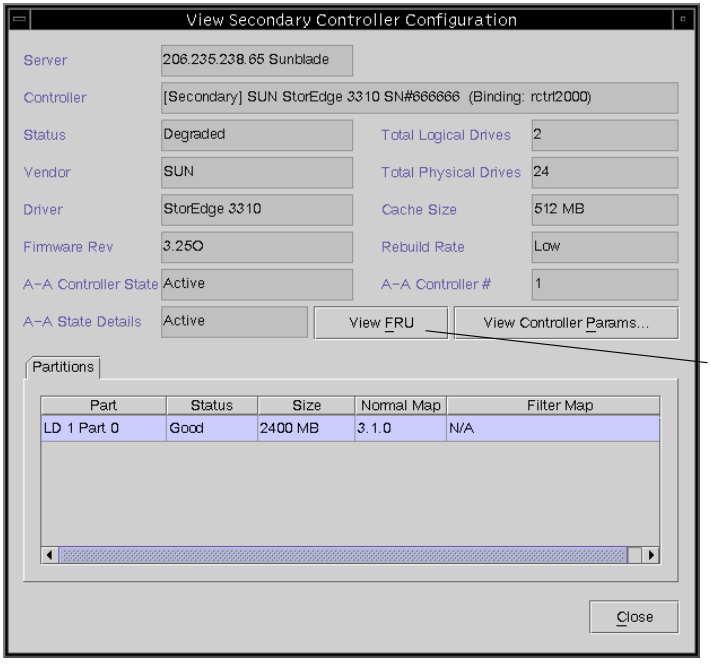

Sun StorEdge(TM) Configuration Service Console
File View Configuration Array Administration Help
Main View
Resource View
Filter View
206.235.238.70 Me262
206.235.238.65 Sunblade
[Ch-0 : Id-0] SUN StorEdge 3310 A-A Array SN#123456
[Secondary] SUN StorEdge 3310 SN#666666
[Array Ch-0 : Id-14] SUN StorEdge 3310 A
[Primary] SUN StorEdge 3310 SN#555555
206.235.238.52 B52



View FRU is not displayed for the Sun StorEdge 3510 Fibre Channel array.

The following two examples show the secondary controller.


Sun StorEdge(TM) Configuration Service Console
File View Configuration Array Administration Help
Main View
Resource View
Filter View
206.235.238.70 Me262
206.235.238.65 Sunblade
[Ch-0 : Id-0] SUN StorEdge 3310 A-A Array SN#123456
[Secondary] SUN StorEdge 3310 SN#666666
[Array Ch-0 : Id-14] SUN StorEdge 3310 A
[Primary] SUN StorEdge 3310 SN#555555
206.235.238.52 B52



View FRU is not displayed for the Sun StorEdge 3510 Fibre Channel array.

Logical Drives Tab

To access this view window, double-click the primary or secondary RAID controller icon in the main window, or select the controller icon and select View → Controller.

Click View Controller Params for editable component parameters on the RAID Controller Parameters window.

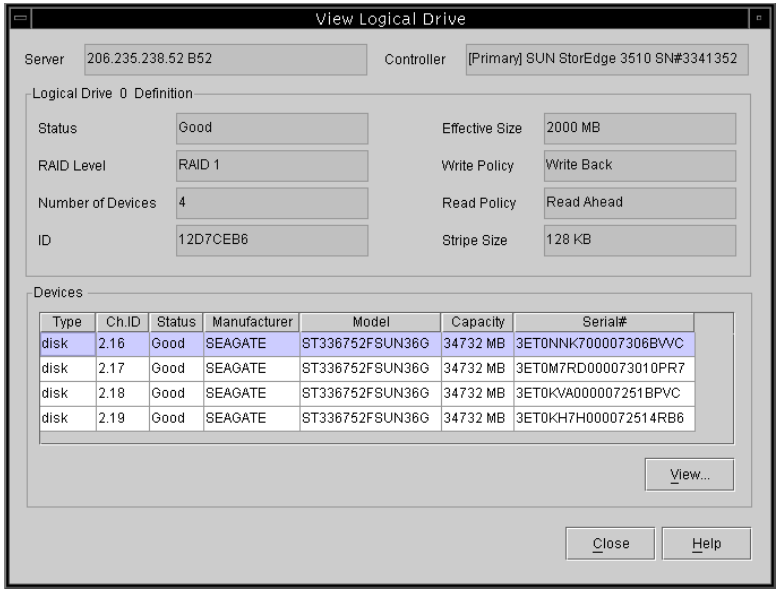
To view a logical drive, select and double-click a drive from the Logical Drives tab, or select a drive and click View.

View Logical Drive

View Logical Drive displays the characteristics of the logical drive that is selected in the main window.

To access this view window, use one of the following methods.

- Double-click the logical drive icon in the main window.
- Select the logical drive icon and select View → View Logical Drive.
- Double-click the RAID controller icon, select a logical drive in the list box, and click View.



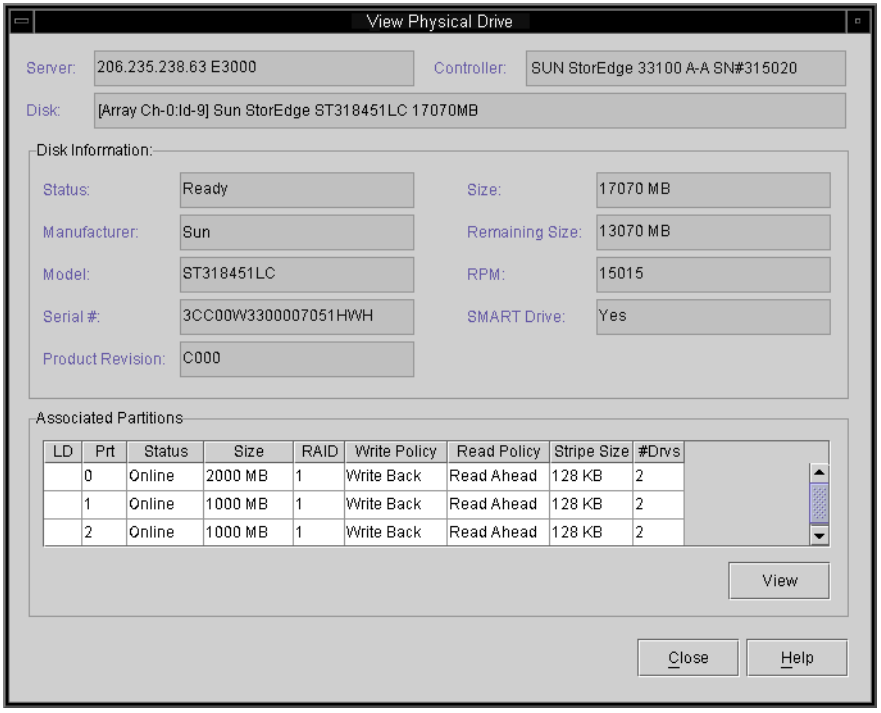
For more information about any of the disk drives listed, either double-click the drive's status record, or select the drive and click View. The View Physical Drive window is displayed.

View Physical Drive

View → View Physical Drive presents the characteristics of the selected physical device. The title of the view window that appears varies, depending on the device selected.

- For a disk drive , it is called View Physical Drive window.
- For a tape drive , it is called View Tape window.
- For a CD-ROM , it is called View CD-ROM window.

You can access one of these windows by double-clicking the physical device in the main window, or by selecting the device and selecting View → View Physical Drive.


View Physical Drive
Server: 206.235.238.63 E3000
Controller: SUN StorEdge 33100 A-A SN#315020
Disk: [Array Ch-0:Id-9] Sun StorEdge ST318451LC 17070MB
Disk Information:
Status: Ready
Size: 17070 MB
Manufacturer: Sun
Remaining Size: 13070 MB
Model: ST318451LC
RPM: 15015
Serial #: 3CC00W3300007051HWH
SMART Drive: Yes
Product Revision: C000
Associated Partitions
LD Prt Status Size RAID Write Policy Read Policy Stripe Size #Drvs
0 Online 2000 MB 1 Write Back Read Ahead 128 KB 2
1 Online 1000 MB 1 Write Back Read Ahead 128 KB 2
2 Online 1000 MB 1 Write Back Read Ahead 128 KB 2
View
Close
Help

- Associated Partitions – displayed only when the selected device is associated with one or more logical drive partitions.
- View – active when there are associated logical drives.

The previous figure displays an example of a View Physical Drive window where the selected physical drive is associated with a single partition.

- Remaining Size – remaining unused capacity when part of a disk drive's capacity has been used in one or more logical drives.
- RPM – the revolutions per minute of the physical drive.
- SMART Drive – indicates whether the drive has predictive failure capability.

You can also select the physical drive and select View. The View Logical Drive window is displayed without the table.

The View Tape and View CD-ROM windows are similar to that shown in the previous figure, but the categories differ slightly.

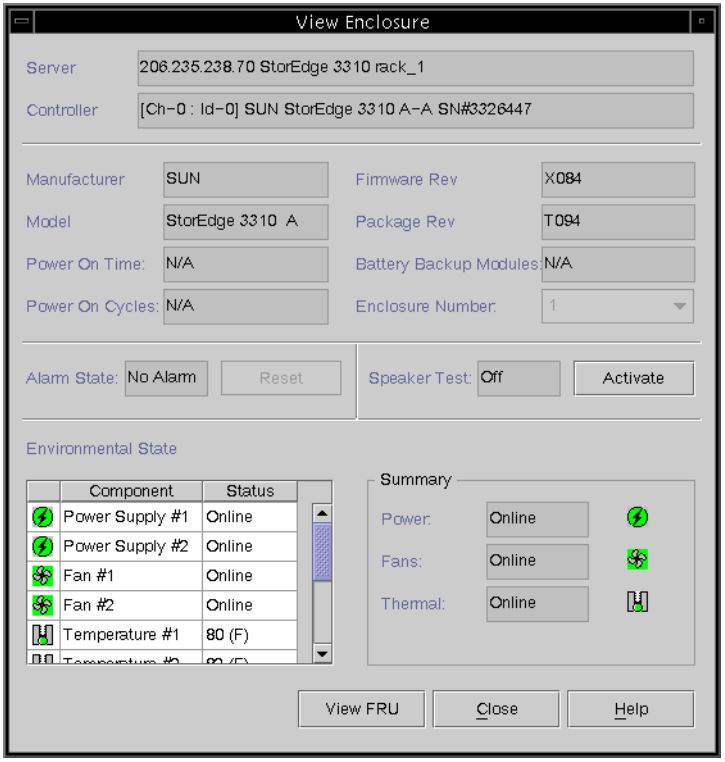
View Enclosure

The View Enclosure window displays the component and alarm characteristics of an array enclosure that is selected in the main window. (For SCSI, the EMU is identified by the name Sun StorEdge 3310 A; Id is always 14 or 15. For Fibre Channel, the SES is identified by the name Sun StorEdge 3510 A; Id is always the last Id within the enclosure in which the SES is contained.)

1. **Select an EMU (SCSI) or SES (Fibre Channel) icon** .
2. **Select View → View Enclosure.**

   The upper two sections of the window identify the enclosure and provide related information. Note that when you have an array with multiple enclosures, you can use the Enclosure Number list box (located in the upper right corner of the window) to reflect another enclosure attached to the same array controller.

   To display the FRU IDs and information for all FRUs in the array, click View FRU.



The Alarm State section of the window applies only if you have an array with a SCSI Accessed Fault-Tolerant Enclosure (SAF-TE) (for a SCSI array) or SCSI Enclosure Services (SES) (for a Fibre Channel array) card.

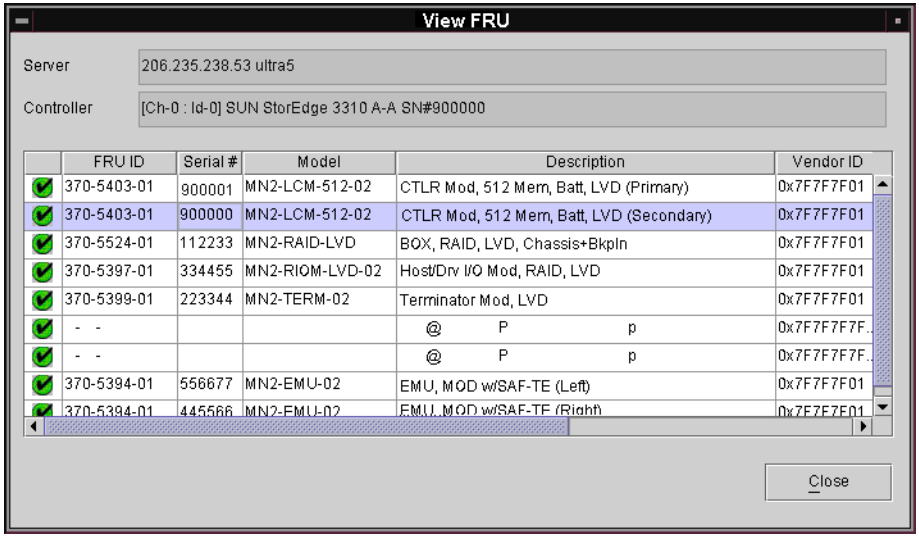
- If the Alarm State field displays `Alarm!` and the Reset button is shown as active, it means that there is an alarm state caused by a failure of a drive, fan, power supply, or battery, or by an abnormal temperature in the enclosure. The audible alarm on the box sounds.
- For the program to continue monitoring after this alarm condition starts, you must click Reset in this window, or you can click Reset on the array enclosure.
- Only users assigned configuration security privileges are allowed to Reset the alarm through the program. Replace the failed component or check the enclosure if its internal temperature is abnormal.

The lower section of the window provides status of the components in the window. When there is a device in the slot, it is represented by a drive icon with a color and a symbol representing its device state.

View FRU

A FRU is a field-replaceable unit. It is a part used to assemble a new system or to repair a system in the field. The Sun FRU ID (field-replaceable unit identification) program is a Sun solution for capturing, transmitting, and analyzing FRU-specific configuration, diagnosis, and failure information residing on the FRU.

Select View → View FRU to display the FRU IDs and information for all FRUs in the array including Serial Number, Model, Description, Vendor ID, Time (time the FRU was programmed), and Location.



Note – You can also view the FRUs for a specific controller by clicking View FRU on the View Controller Configuration window, the View Primary Controller Configuration window, and the View Secondary Controller Configuration window.

Array Administration Progress

Array Admin Progress displays the progress of new logical drive(s) initialization. This command is accessed by selecting View → Array Admin Progress.

Agent Options Management

Agent Options enables you to customize the agent options, including polling time, periodic device discovery time, and SMART monitoring.

To access Agent Options, select View → Agent Options Management. For more information see, “To Configure Agent Parameters (Optional)” on page 54.

Event Log

The console receives, logs, and displays events generated by managed servers and by the console itself.

The majority of the events are generated by the agents on the managed servers and occur when there are:

- Status changes on any device on a managed server, including the server itself (because of device failure, malfunction, or disconnection)
- Inventory changes (addition or removal of devices)
- Configuration changes (initial configuration setup and subsequent configuration changes)
- Array processes running on the server (initialization, parity checking, rebuilding)

Although array processes are initiated by the console, it is the server agent that generates operation notification events after these processes start on the server.

The console generates a much smaller number of events. For example, it generates an event if it does not receive a certain number of consecutive heartbeats from a managed server.

When the console receives any event, it logs it in to the Event Log file, `eventlog.txt`, and displays it in the Event Log window. Also, if the event occurs on a server, the notification of the event is sent to that server’s operating environment/system event log. On an NT server, it would go to the NT event log. In addition, when the event occurs on a server and that server is set up to send traps to an SNMP enterprise management console, such as HP OpenView, the server agent also sends a trap message to that computer.

Depending on the event received, the console might initiate a refresh process to request the inventory from the last periodic scan of the server involved, so the console can update the server’s inventory on the main window.

During this refresh process, the satellite dish icon is attached to the server icon, and you cannot perform any configuration and array activity commands on that server until the process is completed and the main window is updated.

Event Log File

The Event Log window displays up to 500 events at a time. If you have more than 500 events, only the most recent 500 are displayed in the Event Log window; however, the program does not delete any events from the Event Log file, `eventlog.txt`, until more than 10,000 events have been logged.

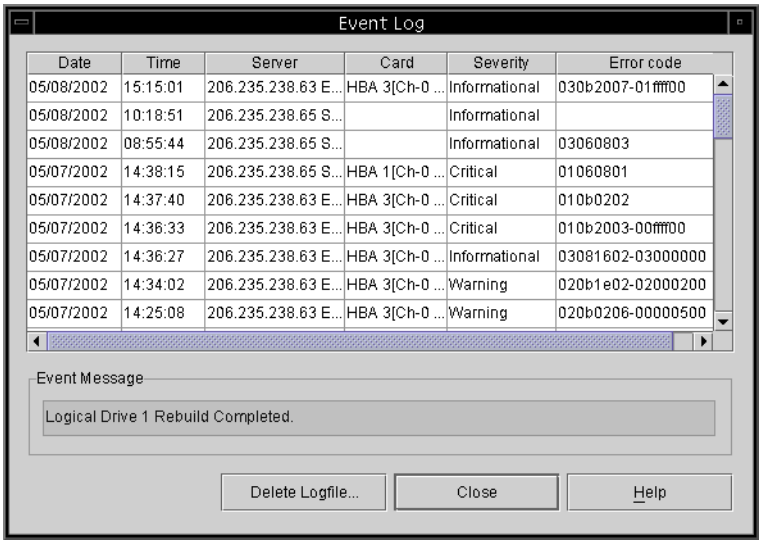
- After 10,000 events, the program reduces the Event Log file to the most current 500 events and then accumulates events until the limit of 10,000 is exceeded again.
- The fields of each event record are separated by a semi-colon so you can easily import the file into a database.
- `eventlog.txt` is located in the directory where the console program files are installed.

Note – If the event log appears not to contain all of the events from the managed array, close and reopen the console.

The events from the agent are logged into the system log of the host where the agent is installed, even if the console is not running. In the Solaris operating environment, the events are logged to `/var/adm/messages` and shown on the console. In the Linux operating environment, the events are logged to `/var/log/messages`. In Windows NT and 2000, the events are logged to the application log of the system, which can be viewed using Event Viewer. You can also read the event log directly from the file `/opt/SUNWsscs/sscsconsole/eventlog.txt`.

Event Log Window

To access Event Log, select View → Event Log. This window can be hidden by clicking Close and reopening (from the View menu) without losing any content.



The console begins to receive events when they are running, regardless of whether the Event Log window is open.

1. **To delete the log file, click Delete Logfile.**

   The Confirmation window is displayed, prompting you to save the log file.

2. **Select one of the following options:**

   - Select yes at the prompt, select a folder and a file name, and save the log file.
   - Select no at the prompt.

     The contents of the log file is deleted.

Note – You can also save and delete the contents of the `eventlog.txt` file using the Save Event Log and Delete Event Log icons on the toolbar.

Each event record contains the fields shown in the following table.

TABLE 9-3 Event Record Fields

Date	The date on the server when the event occurred.
Time	The time on the server when the event occurred.
Server	The IP address of the server and the server name.
Card	The card name, if applicable, for the event.
Severity	One of three severity levels: Critical, Warning, or Informational. (These states are described in the following subsection.)
Error Code	The basic error code and the extended error code, separated by a dash.
Text Message	A text message describing the event.

Severity Levels

- Critical. A message that does require intervention by the network administrator, such as the failure of a device, power supply, or fan.
- Warning. Warning messages generally indicate internal program events. However, if you see a large number of these messages, it might mean that there is a problem with the server or the network.
- Informational. A message about the devices on the server that does not require intervention by the network administrator.

You receive alarm forwarding for the level selected and any other levels of a higher severity. Thus, if you choose Informational, you are also notified of all alarm conditions. However, if you choose Critical, only Critical alarms are received.

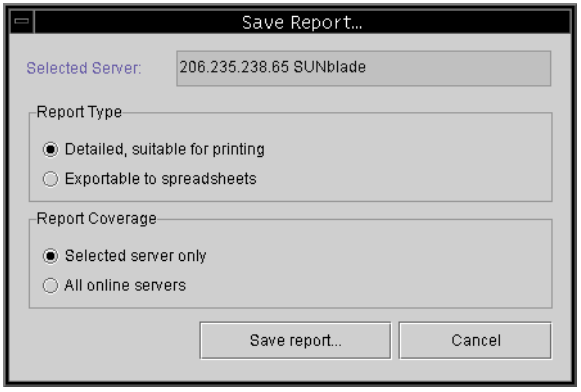
For further information about messages, see “Troubleshooting” on page 243.

Save Report

The Save Report option creates a text file containing all the information available to the program about a specific array.

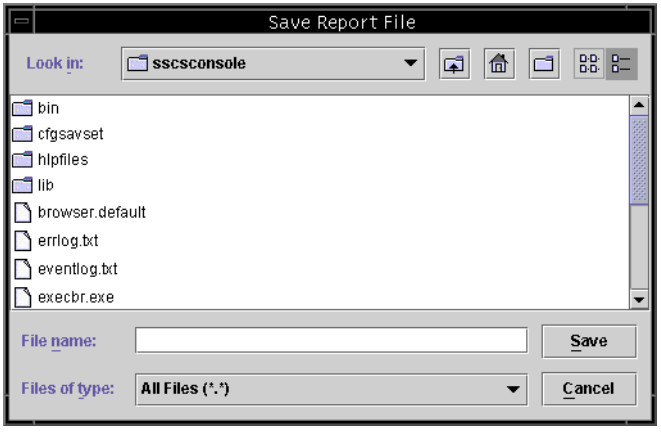
1. **Select File → Save Report.**

   The Report dialog box for confirming the server's ID is displayed. The Exportable to spreadsheets option enables you to save the report with delimiters (Comma, Semicolon, Tab, Colon, and Vertical Bar) for export to spreadsheets.



2. **Select Save report.**

   The Save Report File window is displayed.



3. **Type a file name to identify the file and click Save.**

   The program writes the report on the inventory and status of the selected server and its devices.

   The default save location for the report file is in the installation directory and the default file extension is `.xml`. It might be helpful to create a subdirectory for saving reports, so they do not clutter up the installation directory.

   A report includes the following information:

   - General array details
     - Array name, status, manufacturer, model
     - Firmware version
     - Boot record version
     - MAC, IP, netmask, and gateway address
     - Serial numbers of controllers
   - General overview of the array configuration
     - Total number of logical drives, logical volumes, and partitions
   - Controller parameters
     - Host and drive channel settings and IDs
   - Detailed list of each logical drive
     - RAID level
     - Number and size of physical drives in a logical drive
     - Number and size of partitions per logical drive and their mappings
   - SAF-TE/SES information
   - List of FRUs
   - Details of the physical (hard) drives

The following excerpt is from an example report for a Sun StorEdge 3510 Fibre Channel array in .xml format, which can be used as input into another program. .

CODE EXAMPLE 9-1 Excerpt From Sun StorEdge 3510 Fibre Channel Array Report

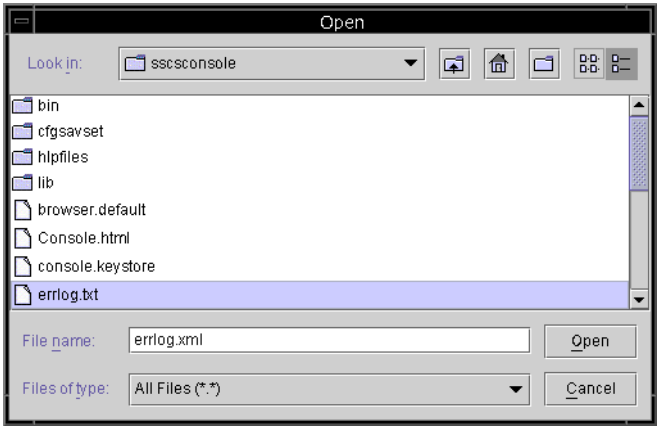
```
<raidbaseview>
    <raidsystem>
        <name> SUN StorEdge 3510 A-A Array SN#000198 </name>
        <status>Good</status>
        <manufacturer>SUN</manufacturer>
        <model>StorEdge 3510</model>
        <firmware_version>3.27K</firmware_version>
        <bootrecord_version>1.31H</bootrecord_version>
        <mac_address>00:C0:FF:00:01:98</mac_address>
        <ip>206.235.238.198</ip>
        <netmask>255.255.255.0</netmask>
        <gateway>206.235.238.1</gateway>
        <primary_sn>3341275</primary_sn>
        <secondary_sn>3341258</secondary_sn>
        <controller_name>198</controller_name>
        <unique_id>198</unique_id>
        <id_of_nvram_defaults>327K 3510 v2.39</id_of_nvram_defaults>
        <total_logical_drives>8</total_logical_drives>
        <total_logical_volumes>0</total_logical_volumes>
        <total_partitions>278</total_partitions>
        <total_physical_drives>24</total_physical_drives>
        <total_safte_ses_devices>1</total_safte_ses_devices>
        <cache_size>1024MB ECC SDRAM</cache_size>
        <cpu>PPC750</cpu>
        <battery>Good</battery>
        <node_name>206000C0FF000198</node_name>
        <fru>
            <idx>0</idx>
            <item></item>
            <serial_number></serial_number>
            <revision></revision>
            <vendor_jedec_id></vendor_jedec_id>
            <manufacturing_date></manufacturing_date>
            <manufacturing_location></manufacturing_location>
```

View Report

Use the View Report option to review a report that was created.

1. **Select File → View Report.**

   The Open dialog box for selecting the report is displayed.



2. **Select the report you want to review and click Open.**

Out-of-Band Storage Management

The out-of-band storage management capability enables you to monitor and manage arrays over the network using TCP/IP. Unlike in-band storage management (the standard method of storage management for storage), which requires the agent to be running on the server that is physically attached to the storage, out-of-band storage management does not require the agent to be running on the server that is physically attached to the storage. With out-of-band storage management, if the server that is attached to the storage is shut down, monitoring and maintenance is unaffected.

The following figures show examples of in-band and out-of-band storage management configurations.

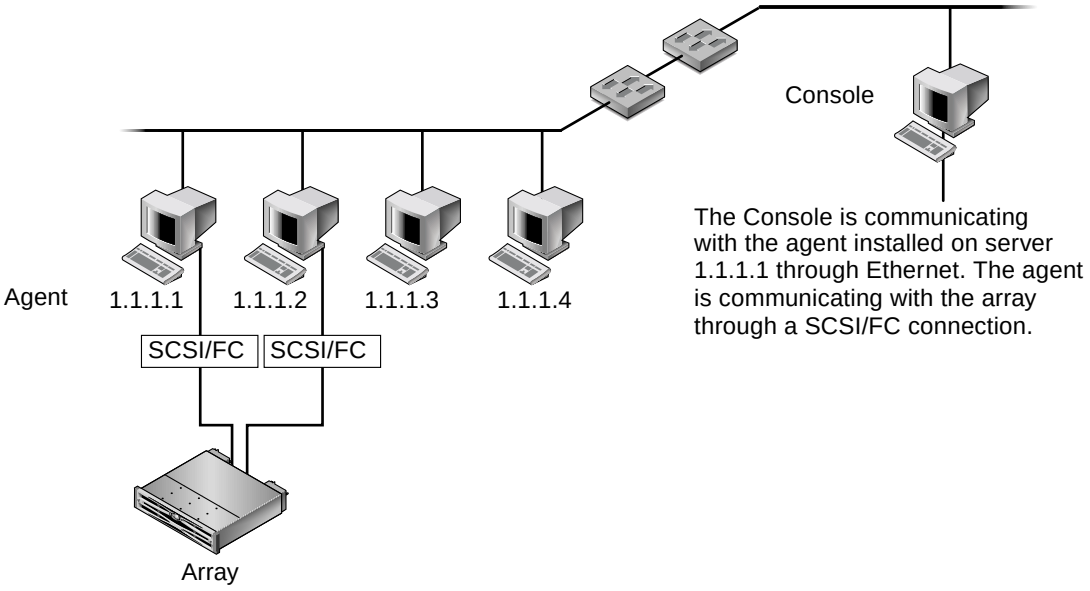


FIGURE 9-1 In-Band Management

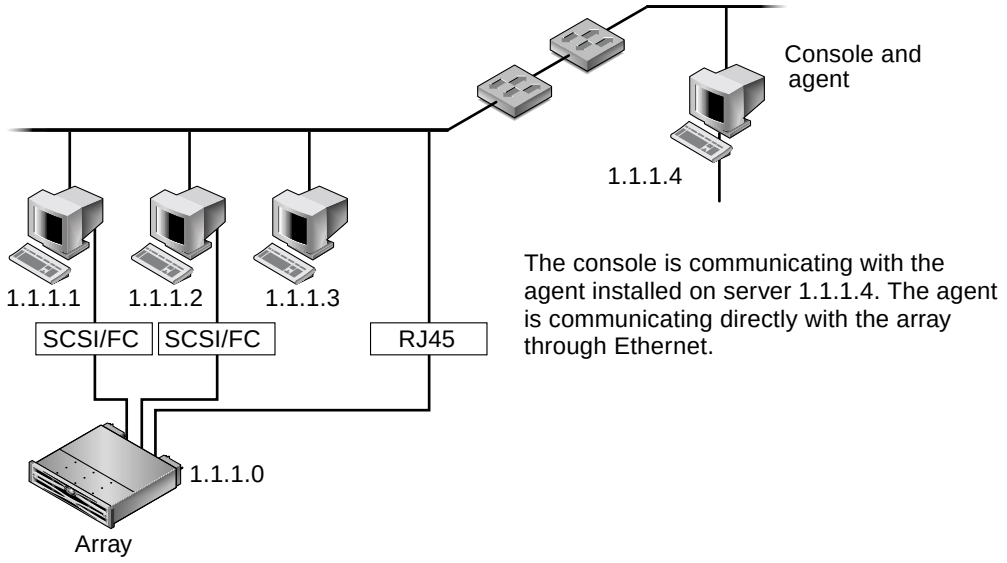


FIGURE 9-2 Out-of-Band Management

▼ To Use Out-of-Band Management

Note – Controller, SAF-TE, and Drive firmware cannot be upgraded through out-of-band management.

---

1. **Make sure you have set up a static or dynamic IP address for the array.**

   If the program has been configured already to manage the array through in-band, you can set the IP address through Change Controller Parameters. To set the IP address, see "Network Tab" on page 188. If the program has not been configured yet, you can set the IP address through an RS-232 terminal. Refer to the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array.

2. **After setting the IP address, reset the controller.**

   Select Array Administration → Controller Maintenance, and then click Issue Reset to the Controller.

3. **Select the server.**

4. **Select View → Agent Options Management.**

5. **In the Agent Options Management window, check Out-Of-Band Agent preferred over In-Band.**

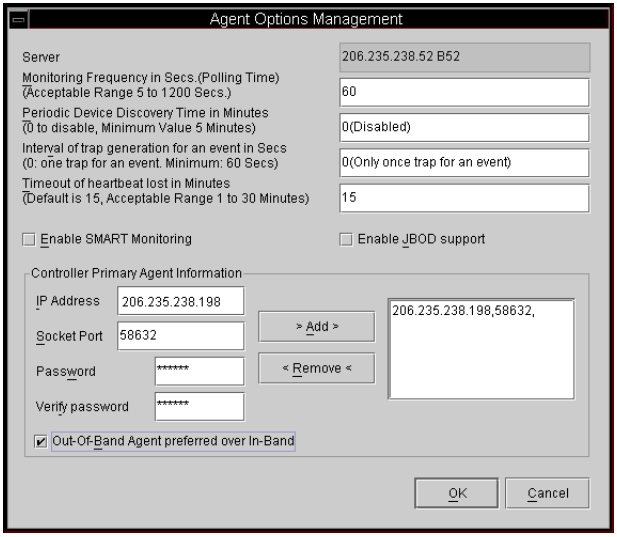
Note – With this option checked, out-of-band becomes the preferred method of storage management. If the out-of-band configuration is removed, the program reverts to in-band storage and monitoring after you start/restart the services.

---

6. **Type the IP address of the array in the IP Address field, and click Add.**

7. **If you have created a password for the array using the firmware application, type it in the Password field, and then re-type it in the Verify Password field.**

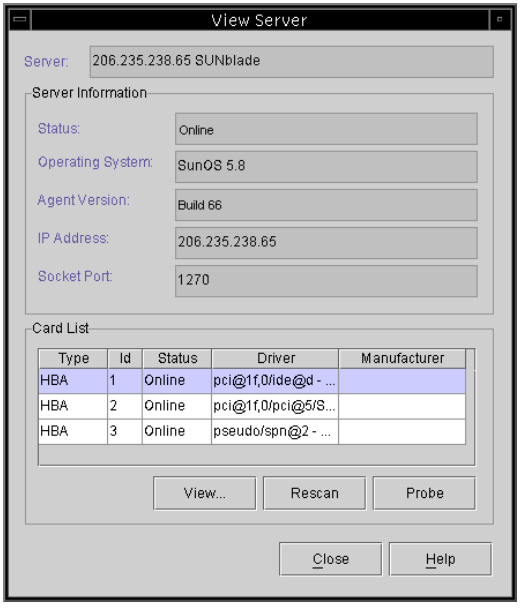
Note – By default there is no password set for the array. For information on creating or changing the password, refer to the *Sun StorEdge 3000 Family RAID Firmware User's Guide* for your array.



8. **For the program to recognize the out-of-band array and display it in the main window, select the server.**

9. **Select View → View Server.**

10. **Click Probe.**

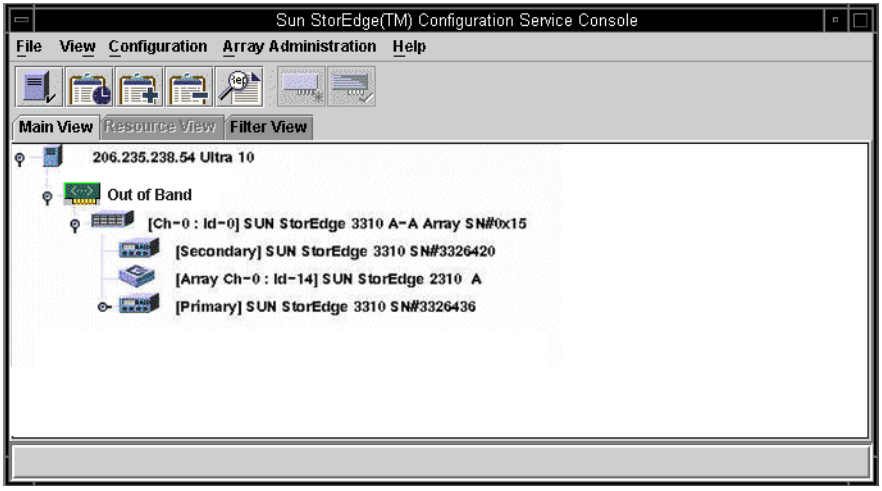


11. **If the program has not been configured to manage the array, you need to assign the server to manage the controller.**

    Select Array Administration → Controller Assignment. Select a server from the Server to manage this controller list and click Apply.

    An out-of-band HBA is displayed in the main window.

Note – If an out -of-band HBA is not displayed in the window, reset the controller.


Sun StorEdge(TM) Configuration Service Console
File View Configuration Array Administration Help
Main View Resource View Filter View
206.235.238.54 Ultra 10
Out of Band
[Ch-0 : Id-0] SUN StorEdge 3310 A-A Array SN#0x15
[Secondary] SUN StorEdge 3310 SN#3326420
[Array Ch-0 : Id-14] SUN StorEdge 2310 A
[Primary] SUN StorEdge 3310 SN#3326436

▼ To Remove an Array From Out-of-Band Management

1. **Select the server.**
2. **Select View → Agent Options Management.**
3. **Select the array you want to remove from the Managed Primary Agent list, and click Remove.**

   The HBA remains displayed in the main window; to remove it, you need to stop / restart services.

Managing Storage Through the Web

The web-based storage management capability enables you to conveniently manage the array through the web without having to load the entire Sun StorEdge Configuration Service package. The following steps describe how to set up the array for web-based management and how to access it through a web browser.

Note – This feature requires Sun StorEdge Enterprise Storage Manager Topology Reporter (included in the Sun StorEdge Enterprise Storage Manager software) to be installed on a Solaris host. Refer to the "Other Supported Software" section in the *Sun StorEdge 3000 Family Release Notes* for your array for more information.

Note – This feature is not supported on Linux; that is, if the agent has been installed on a system running the Linux operating environment, the Configure Web Server option on the Custom Configure window is unavailable. You can use a Linux web browser to load the console, but the agent must be installed on a system running the Solaris operating environment.

Web Browser Requirements

Sun StorEdge Enterprise Storage Manager Topology Reporter can be viewed through a URL on any machine connected to the same network (you must have an account on the Solaris operating environment machine).

Solaris or Linux Operating Environments

- Netscape 4.79
- Java Plug-in 1.2.2_02

Windows NT/2000 Operating Systems

- Internet Explorer 5.0 or later
- Java Plug-in 1.2.2_02

or

- Netscape 4.76
- Java Plug-in 1.2.2_02

Setting Up the Array

Although the entire Sun StorEdge Configuration Service package isn't required to be loaded on the machine that is going to be used to access the array from the web, a few program files are needed; therefore, the entire Sun StorEdge Configuration Service package must be installed on another server so you can transfer files from it to the array. The following procedure describes how to conveniently transfer the necessary files to set up web management.

1. **Make sure you have an Ethernet connection from the network to the array and you have established an IP address for the array.**
2. **From the server that has the entire Sun StorEdge Configuration Service package installed, select Configuration → Custom Configure.**
3. **Select Configure Web Server.**
4. **Verify the IP address of the managing agent, which is the agent that is running on the server directly connected to the storage.**
5. **Enter the IP address of the array where the files are going to be transferred and click OK.**

Note – By default there is no password set for the array. If you have created one using the firmware application, you must enter it. For information on creating or changing the password, refer to the *Sun StorEdge 3000 Family RAID Firmware User's Guide* for your array.

Web Server Configuration Information
Verify the IP address of the managing agent:
206.241.235.42
Verify the IP address of the StorEdge device:
206.243.255.52
Enter the root password of the StorEdge device:
Reenter the root password of the StorEdge device:
OK
Cancel

After the files are transferred successfully, a confirmation message is displayed, and the console can now be accessed through the web.

▼ To Access the Console From the Web Browser

1. **Open the web browser.**
2. **Type the following URL address:**

```
http:// ip address of workstation/esm.html
```

3. **Continue monitoring, maintaining, and updating storage as explained in the applicable chapters in this guide.**

CHAPTER 10

Maintaining the Array

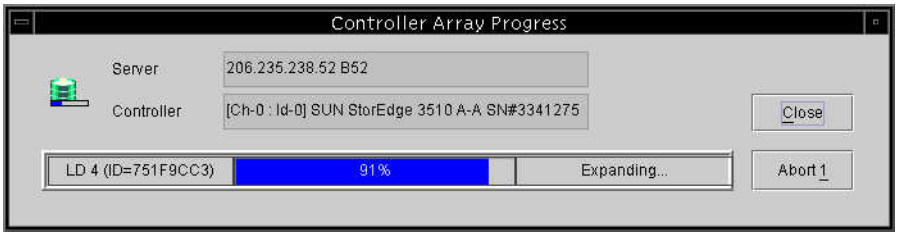
This chapter explains how to maintain the integrity of the array using Array Administration. Topics covered in this chapter are as follows:

- "Array Administration Activities" on page 135
  - "To Check Parity" on page 136
  - "To Schedule a Parity Check" on page 137
- "Failed Drives" on page 139
  - "To Automatically Rebuild a Drive Using a Standby Drive" on page 139
  - "To Rebuild a Device Without a Standby Drive" on page 140
  - "To Check the Progress of the Rebuilding Process" on page 141
  - "To Manually Rebuild a Failed Drive" on page 141
  - "To Restore a Logical Drive Configuration" on page 143
  - "To Reset the Controller" on page 146
  - "To Mute the Controller Beeper" on page 146
  - "To Bring a Failed Controller Back Online" on page 147
  - "To Display Performance Statistics" on page 149

Array Administration Activities

Array administration activities such as initialization, drive rebuilding, and parity checking can take some time, depending on the size of the logical drive or physical drives involved.

After one of these processes has started, the Controller Array Progress window is displayed. If you close the window, to view progress, click the Progress Indicator icon or select View → Array Admin Progress.



▼ To Check Parity

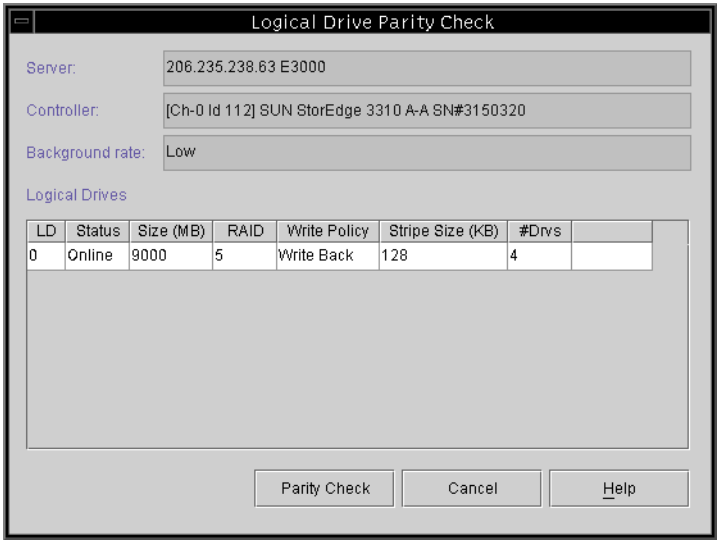
Parity checking is the process where the integrity of redundant data on fault-tolerant logical drives or LUNs (RAID 3 and 5) is checked.

1. **Select the logical drive on which you want to run parity check.**
2. **Select Array Administration → Parity Check.**

Note – You need to be logged in as either `ssadmin` or `ssconfig` to access options on this menu.

---

3. **When the Logical Drive Parity Check window is displayed, select the logical drive on which you want to run a parity check.**



To run a parity check on multiple drives, use the Array Administration → Schedule Parity Check command to schedule a parity check to be run in the near future (such as within three minutes). When scheduled parity check runs, it automatically performs the parity checks one after another.

4. **Click the Parity Check button to start the parity check process.**

   Once a parity check has started, the Progress Indicator is automatically displayed. If this window is closed, it can be reopened by selecting View → Array Admin Progress or by clicking the Progress Indicator icon. A window is displayed that shows the percentage of completion progress for each array.

▼ To Schedule a Parity Check

Select Array Administration → Schedule Parity Check to check parity of a specific logical drive array at scheduled intervals (for example, during off hours).

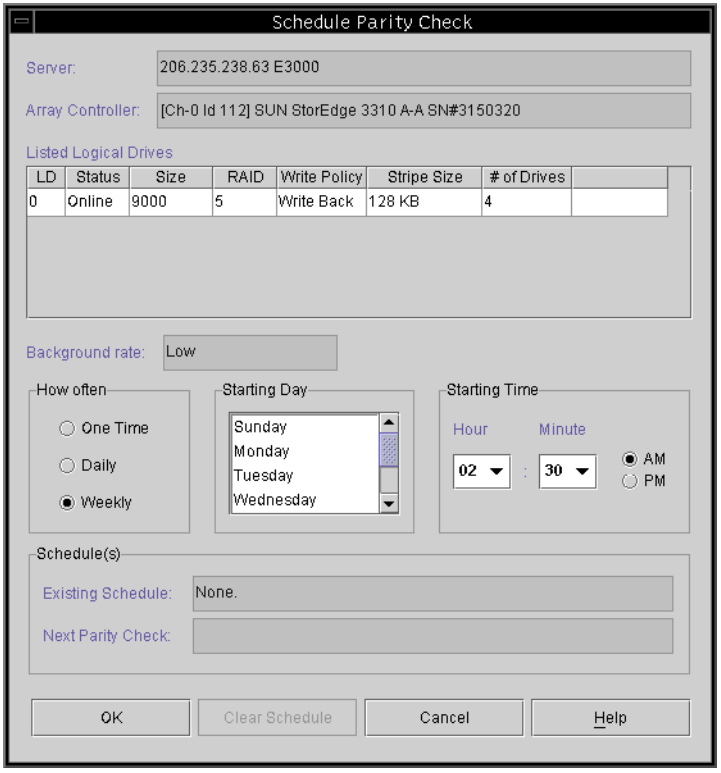
- You can choose to schedule any number of logical drives configured on a managed server; however. you can establish only one schedule per array controller.
- When you schedule multiple logical drives, the check is done in sequence from the lowest to the highest numbered logical drive.
- A parity check requires an average of five minutes per Gbyte of storage.
- You can control the amount of system resources allocated to the parity check by changing the background rate.
- A parity check can be stopped once it has started. There is no data corruption as a result of this operation.

Note – You need to be logged in as either `ssadmin` or `ssconfig` to access options on this menu.

---

1. **Select the controller on which you want to schedule the parity check.**
2. **Select Array Administration → Schedule Parity Check.**

   The Schedule Parity Check window is displayed.



3. **Make selections in the appropriate fields on this window.**
   - Listed Logical Drives – A list of the available fault-tolerant logical arrays. Use the Shift key to select multiple drives.
   - Background Rate – The percentage of available array controller CPU time assigned to array administration activities. Select Change Controller Parameters from the Custom Configuration Options window to change the background rate.
   - How Often – Specify how often you want the parity checked.
   - Starting Day – Specify the day of the week you would like this schedule to start.
   - Starting Time – Specify the time on the starting day you would like this schedule to begin.
   - Existing Schedule – The current parity schedule: logical drive, frequency, starting day, and time.
   - Next Parity Check – The date and time you want the next parity check to start.
4. **When you are satisfied with the schedule, click OK.**

Failed Drives

This section contains procedures for recovering from a drive failure with and without a standby drive. If for some reason these procedures do not start the rebuilding process, instructions are also provided for manually starting a rebuild after a drive failure.

Caution – Install either local or global standby drives previously installed and configured for each logical drive array before a failure occurs. Depending on the type of RAID level used and archiving procedure implemented, significant data loss might occur in cases of single or multiple drive failures. Additionally, make tested spare drives readily available on site for immediate replacement if a malfunction occurs.

▼ To Automatically Rebuild a Drive Using a Standby Drive

When a drive associated with a fault-tolerant logical drive fails, and a standby drive has previously been installed and configured as either a global or local spare, the failed drive is automatically substituted and its data rebuilt using the designated spare drive. For this to occur flawlessly, the spare drive's capacity must *always* be equivalent to or larger than the failed drive that is being replaced.

The rebuilding process normally starts within one to two minutes. It is performed in the background and takes approximately eight minutes per Gbyte when there is no other activity on the controller.

During the automatic rebuild process, normal activity might continue, although performance might degrade. The degree to which performance degrades is determined by the background rate set for the controller.

The progress of the rebuild process is displayed when you select View → Array Admin Progress.

1. **Reestablish automatic rebuild capability by replacing the failed drive, using instructions contained in the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array.**

2. **Wait at least 60 seconds after removing the failed drive before inserting a new drive.**

   Make sure the replacement drive is at least equal to the largest drive in the enclosure. Install the replacement drive in the same slot (drive bay) as the failed drive; the replacement drive then becomes the new standby drive.

3. **After the rebuild process is complete and the logical drive is online again, back up the array controller configuration to a file on an external drive or diskette.**

   See "To Save the Logical Drive Configuration" on page 59.

▼ To Rebuild a Device Without a Standby Drive

If there is no standby drive in the array, you need to replace the failed drive before the automatic rebuild process can start.

1. **To recover from a drive failure when there is no standby drive, replace the failed drive by using the instructions contained in the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array.**

2. **Wait at least 60 seconds after removing the failed drive before inserting a new drive.**

   Make sure the capacity of the replacement drive is at least equal to that of the failed drive. Install the replacement drive at the same address (drive bay) as the failed drive.

3. **Once the failed drive is replaced in the same slot, you need to scan it in.**

   For detailed instructions on scanning in a drive, see "To Scan in New Hard Drives" on page 168.

4. **After the drive has been scanned, you need to manually rebuild it by selecting Array Administration → Rebuild.**

▼ To Check the Progress of the Rebuilding Process

1. **Select View → Array Admin Progress or click the Progress Indicator icon in the upper right corner of the window .**

   The Controller Array Progress window is displayed that shows the completion percentage of the rebuild. However, if there are array activities (such as initialization, rebuild, or parity check) occurring on multiple controllers, the Select Controller Progress window is displayed first.

2. **Select the controller whose progress you want to view and click OK.**

   The Controller Array Progress window is displayed that shows the array progress of the selected controller. For more information, see “Array Administration Activities” on page 135.

▼ To Manually Rebuild a Failed Drive

In most cases, you do not need to use the manual rebuild process because replaced drives are automatically rebuilt.

If a spare is not present when the failure occurs, or for some reason the drive does not rebuild, you can use Rebuild to manually start the rebuild process. Also, if the rebuild process is interrupted by a reset, use Rebuild to restart the rebuilding process.

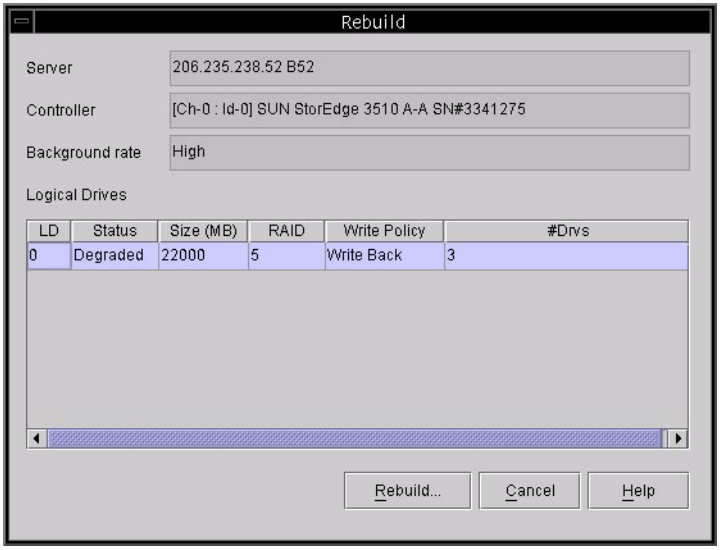
1. **Replace the failed drive, using the instructions contained in the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array.**

2. **Wait at least 60 seconds after removing the failed drive before inserting a new drive.**

   Make sure the capacity of the replacement drive is at least equal to that of the largest drive in the enclosure.

3. **Select Array Administration → Rebuild.**

   The Rebuild window is displayed.



4. **Select the status record of the replacement drive.**

5. **Click Rebuild to start the rebuild process.**

   The rebuild process is performed in the background and takes approximately eight minutes per Gbyte when there is no other activity on the array controller. During a rebuild, normal activity can continue, although performance might degrade. The degree to which performance degrades is determined by the background rate set for the controller.

6. **To check the progress of the rebuilding process, select View → Array Admin Progress or click the Progress Indicator icon in the upper right corner of the window.**

   The Controller Array Progress window is displayed that shows the completion percentage of the rebuild.

   If there are array activities (such as initialization, rebuild, or parity check) occurring on multiple controllers, the Select Controller Progress window is displayed first.

7. **Select the controller whose progress you want to view and click OK.**

   The Controller Array Progress window is displayed and shows the array rebuilding status for that controller.

▼ To Restore a Logical Drive Configuration

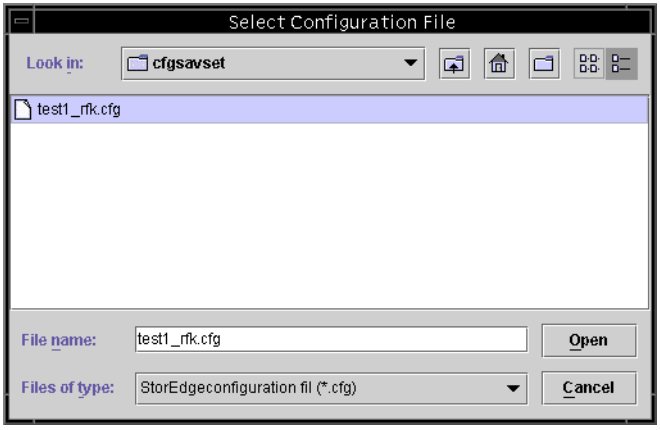
This section describes how to restore the array configuration information from a backup file. You must have saved a backup file using the Save command as explained in “Configuration File” on page 85. If the array controller and its drives are damaged, you can restore the array configuration to a new controller without having to completely reconfigure the storage array.

Caution – Restore the array configuration from a file only if the configuration file is current. Data loss will result from restoring an outdated or incorrect configuration.

If you are sure that the backup file contains the correct array configuration information, continue with the following procedure to restore the configuration.

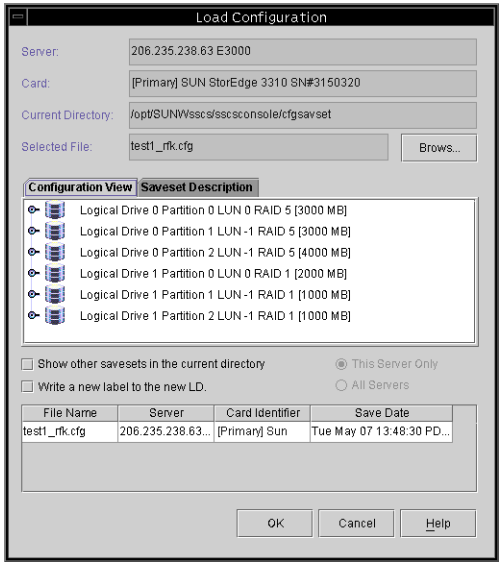
1. **Select the controller for the appropriate array.**
2. **Select Configuration → Load Configuration.**

   The Select Configuration File window is displayed.

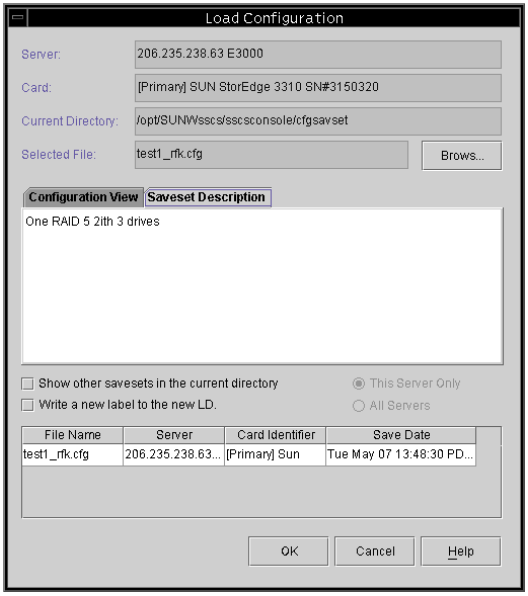


3. **Specify the name and location of the backup configuration file and click Open.**

The Load Configuration window is displayed. To see a tree-view representation of the configuration, click the Configuration View tab.



The Saveset Description tab displays the description of the file that was specified when the configuration file was created.

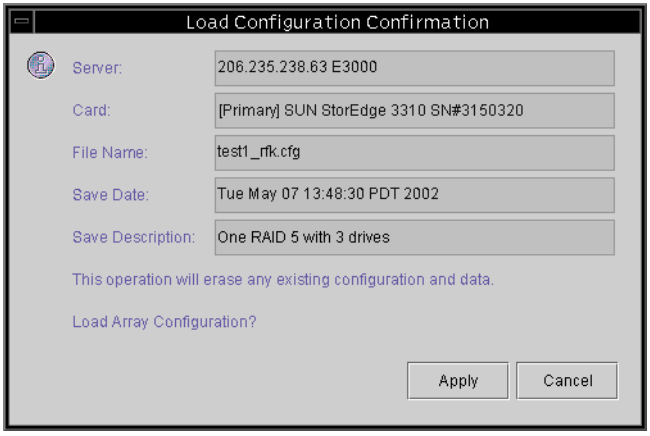


4. **(Solaris OE only). If you want the logical drive(s) to be automatically labeled, which enables the operating environment to use the drive, click Write a new label to the new LD.**

5. **To load the saved configuration, select OK.**

   The Load Configuration Confirmation window is displayed.

   Carefully review the information presented in the Load Configuration Confirmation window before making a decision to continue.



6. **Click Apply to load this configuration or click Cancel to terminate this function.**

   Apply causes the configuration operation to continue, and a progress window is displayed.

Note – Do *not* initialize LUN(s) after restoring the array configuration backup file contents.

---

7. **If you are running Windows NT, shut down and restart the operating system.**

   Reinitializing the operating system is required to enable the logical drive configuration to be recognized by Windows NT.

▼ To Reset the Controller

Whenever you make changes to the controller parameters, you are asked if you want to reset the controller so that the changes take effect. If you are making multiple changes, you might not want to stop and reset the controller after each change. Use the Issue Reset to the Controller option to manually reset the controller after making multiple parameter changes.

1. **Select any storage icon in the main window.**
2. **Select Array Administration → Controller Maintenance.**
3. **If you are not already logged in as** `ssconfig`**, a password prompt is displayed; type the** `ssconfig` **password.**

   The Controller Maintenance Options window is displayed.
4. **Click Issue Reset to the Controller.**

Note – Resetting the controller on a Sun StorEdge 3310 SCSI array can result in host-side error messages, such as parity error and synchronous error messages. No action is required and the condition corrects itself as soon as reinitialization of the controller is complete.

▼ To Mute the Controller Beeper

When an event occurs that causes the controller to beep, for example, when a logical drive fails, during a rebuild, or when adding a SCSI drive, you can mute the controller beeper. in one of two ways.

1. **Select the controller icon in the main window.**
2. **Select Array Administration → Controller Maintenance.**
3. **If you are not already logged in as** `ssconfig`**, a password prompt is displayed; type the** `ssconfig` **password.**

   The Controller Maintenance Options window is displayed.
4. **Click Mute Controller Beeper.**

   or

1. **Select the desired controller icon in the main window.**
2. **Select Configuration → Custom Configure.**

3. **Select Change Controller Parameters.**
4. **Select Mute Beeper.**

▼ To Bring a Failed Controller Back Online

If a controller fails, bring it back online in one of two ways.

1. **Select the desired controller icon in the main window.**
2. **Select Array Administration → Controller Maintenance.**
3. **If you are not already logged in as** `ssconfig`**, a password prompt is displayed; type the** `ssconfig` **password.**

   The Controller Maintenance Options window is displayed.
4. **Click Deassert Failed Redundant Controller.**

   or

1. **Select the desired controller icon in the main window.**
2. **Select Configuration → Custom Configure.**
3. **Select Change Controller Parameters.**
4. **Select the Redundancy tab.**
5. **From the Set Controller Config field, select Redundant Deassert Reset.**

▼ Converting a Dual Controller Array to a Single Controller Array

If one controller fails in a dual array controller configuration, you might want to run a single controller for an extended period of time so that the array does not display as degraded in the console.

1. **Make sure you know the serial number of the controller being removed.**

   You can check the event log for the failed controller's serial number or check the console and make a note of the primary controller's serial number.
2. **Change the remaining controller's redundancy setting to disabled.**

You must use the firmware application to disable redundancy on the controller. Refer to the *Sun StorEdge 3000 Family RAID Firmware User's Guide* for your array for information about accessing the firmware application, and then continue with the following steps.

a. **From the Main Menu, select view and edit Peripheral devices, and press Return.**

b. **Select Set Peripheral Device Entry, and press Return.**

c. **Select Redundant Controller – Primary, and press Return.**

d. **Select Disable redundant controller, and press Return.**

3. **Stop the Agent as explained in the installation chapter for your operating environment/system.**

4. **Change to** `/var/opt/SUNWsscs/ssagent` **and edit the file** `sscontlr.txt`**.**

   The very last line in the file contains the serial numbers of both controllers. Remove the failed controller's serial number from this line.

```
# RAID_CONTROLLER=Enable:3197861:3179746
```

5. **Start the agent as explained in the installation chapter for your operating environment/system.**

6. **Rescan the console if it was open during this procedure.**

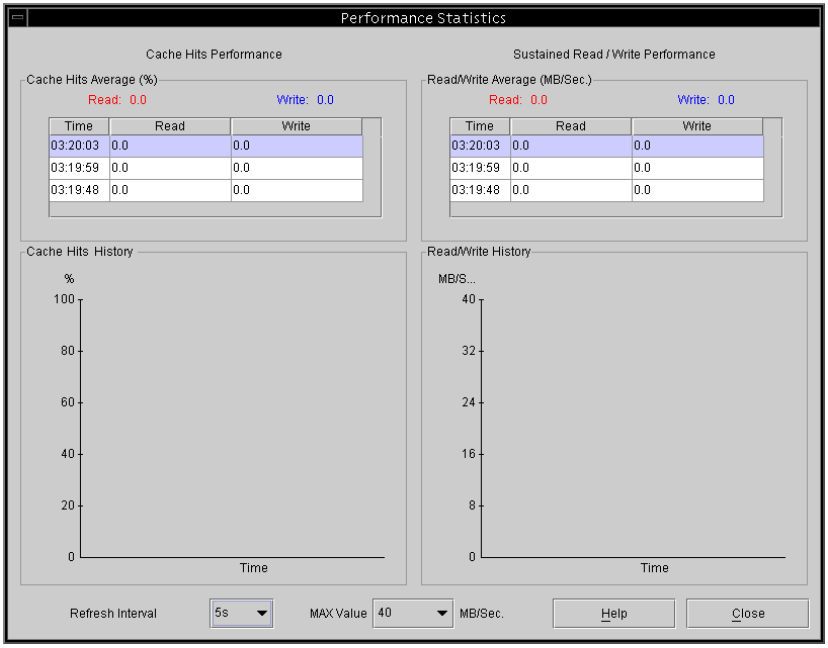
▼ To Display Performance Statistics

Using Performance Statistics, you can determine the data transfer rate, that is, the speed the array is running at.

1. **Select Array Administration → Controller Maintenance.**
2. **If you are not already logged in as `ssconfig`, a password prompt is displayed; type the `ssconfig` password.**

   The Controller Maintenance Options window is displayed.
3. **Click Performance Statistics.**

   The Performance Statistics window is displayed.



CHAPTER 11

Updating the Configuration

Refer to this chapter when you want to change the current configuration or add to it. This chapter describes the following tasks:

- "To Add a Logical Drive or Add a Logical Volume From New Logical Drives" on page 152
- "To Delete a Logical Drive or Logical Volume" on page 156
- "To Create a Partition" on page 159
- "To Delete a Partition" on page 161
- "To Expand the Capacity of a Logical Drive or Logical Volume" on page 163
- "To Add SCSI Drives to an Existing Logical Drive" on page 165
- "To Copy and Replace Member Drives" on page 166
- "To Scan in New Hard Drives" on page 168
- "To Download RAID Controller Firmware" on page 169
- "To Upgrade Firmware and Boot Record" on page 172
- "To Upgrade Firmware on Hard Drives" on page 173
- "To Upgrade Firmware on SAF-TE/SES Devices" on page 174
- "To Change Controller Parameters" on page 175
- "To Save Changed Values" on page 176
- "To Mute the Controller Beeper" on page 189
- "To Assign or Change Standby Drives" on page 190
- "To Edit a Server Entry" on page 191

The Configuration menu commands and tool icons might be temporarily disabled if an array administration process, such as parity checking, is running. The menu command is also shown as deactivated when the console is refreshing its inventory on the server. A satellite dish symbol is attached to the server icon during the refresh process .

To use the Configuration options, you must log into the `ssconfig` security level of the software with the `ssconfig` password. When you are finished with the configuration activities, log back into the monitoring level of the program.

▼ To Add a Logical Drive or Add a Logical Volume From New Logical Drives

Use this option to add one or more logical drives to an existing configuration of RAID sets or to add a logical volume from *new* logical drives. To add a logical volume from *existing* logical drives, see "To Add a Logical Volume From Existing Logical Drives" on page 155.

Note – If the logical drive is going to be larger than 253 Gbyte, see "To Prepare for Logical Drives Larger Than 253 Gbyte" on page 73.

---

1. **Select the appropriate array.**
2. **Select Configuration → Custom Configure.**

Note – This selection is inactive unless you have selected an array with available physical drives.

---

3. **Select Add LDs/LVs to the Current Configuration from the Custom Configuration Options window.**
4. **Verify that the server and controller displayed at the top of the window are correct.**
5. **Select a disk you want to be included in the new logical volume and click Add Disk.**

   If you make a mistake or change your mind, select the drive and click Remove Disk**.**
6. **Select a RAID Level.**

   For definitions of RAID levels, see "RAID Basics" on page 195.
7. **Select the desired Host channel and SCSI ID to which you would like the new logical drive to be mapped to from the Channel and the SCSI ID list boxes.**
8. **Set the Max Drive Size.**

   The Max Drive Size displays the total capacity of each disk. A smaller logical drive can be created by decreasing this value.

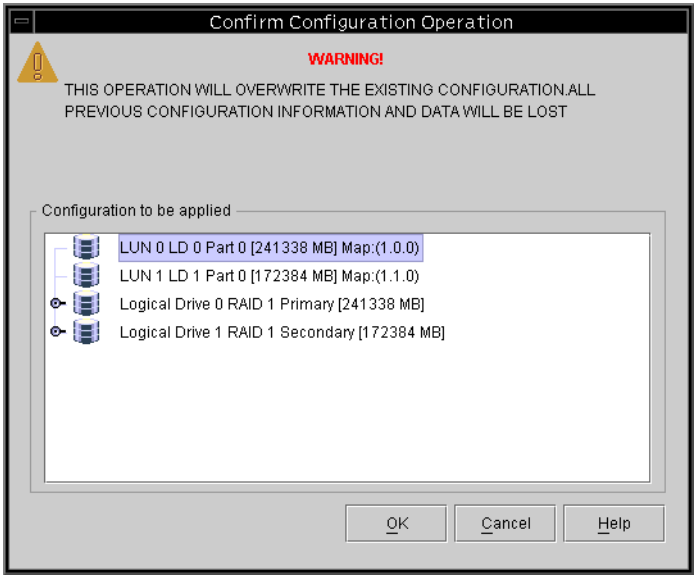
Note – If you do not change the Max Drive Size but you do change the Partition Size, a new partition is created at the specified partition size. The remaining logical drive size capacity moves to the last partition. Remaining capacity can be used later by expanding the drive (as explained in “To Expand the Capacity of a Logical Drive or Logical Volume” on page 163). The drive capacity is no longer editable after a partition is created.

Note – If you want to create another logical drive on the same controller, click New LD. The logical drive you just defined is created and you are returned to the top of the window, enabling you to create another logical drive. On a Sun StorEdge 3310 SCSI array, you can create up to eight logical drives with up to 32 partitions per logical drive. On a Sun StorEdge 3510 FC array, you can create up to eight logical drives with up to 128 partitions per logical drive.

9. **To add this logical drive to a logical volume, click New LD and see “To Add a Logical Drive to a Logical Volume” on page 154.**

10. **When you are satisfied with the selections on this window, and do not want to define another logical drive, click Commit.**

    A confirmation window is displayed showing the new configuration.


Confirm Configuration Operation
WARNING!
THIS OPERATION WILL OVERWRITE THE EXISTING CONFIGURATION.ALL PREVIOUS CONFIGURATION INFORMATION AND DATA WILL BE LOST
Configuration to be applied
LUN 0 LD 0 Part 0 [241338 MB] Map:(1.0.0)
LUN 1 LD 1 Part 0 [172384 MB] Map:(1.1.0)
Logical Drive 0 RAID 1 Primary [241338 MB]
Logical Drive 1 RAID 1 Secondary [172384 MB]
OK
Cancel
Help

11. **Click OK to accept the configuration or Cancel to return to the console.**

    This provides additional fault tolerance. A drive's state can always be changed back to available when needed.

Note – You cannot change a logical drive configuration after you click OK.

Note – During initialization LD/LV size is displayed as 0 Mbyte.

▼ To Add a Logical Drive to a Logical Volume

A logical volume is composed of two or more logical drives and can be divided into a maximum of 32 partitions. During operation, the host sees a nonpartitioned logical volume or a partition of a logical volume as one single physical drive.

1. **Create a logical drive as described in Steps 1-8 in "To Add a Logical Drive or Add a Logical Volume From New Logical Drives" on page 152.**

Note – Do not partition the logical drive that you are adding to the logical volume. A logical drive that has been partitioned cannot be added to a logical volume.

---

2. **Before you click Commit, to add the logical drive to a logical volume, click Add to LV.**

   The logical drive is added to the LV Definition box. The total size of the logical volume is displayed in the Available Size (MB) field.

Note – Because the logical volume has not been partitioned yet, the Part Size (MB) and the Available Size (MB) are equal. A single logical volume is considered to be a single partition.

---

3. **To create another logical drive to add to the logical volume, click New LD.**
4. **Create the logical drive and add it to the logical volume by clicking Add to LV.**

   Repeat this step for every logical drive you want to add to the logical volume.

5. **To create a partition, see "To Create a Partition" on page 159.**
6. **When you have finished adding logical drives to the logical volume, to create another logical volume or an individual logical drive, click Commit LV.**

   When you are finished creating logical volumes and do not want to create an individual logical drive, click Commit.

Note – When you are finished creating logical volumes and want to exit the New Configuration window, if you accidentally click Commit LV instead of Commit, you will have to create another logical drive; otherwise, you have to click Cancel and configure the logical volume again.

▼ To Add a Logical Volume From Existing Logical Drives

Note – Before you can add a logical volume from existing logical drives, you must unmap the logical drives.

1. **Select the appropriate array.**
2. **Select Configuration → Custom Configure.**

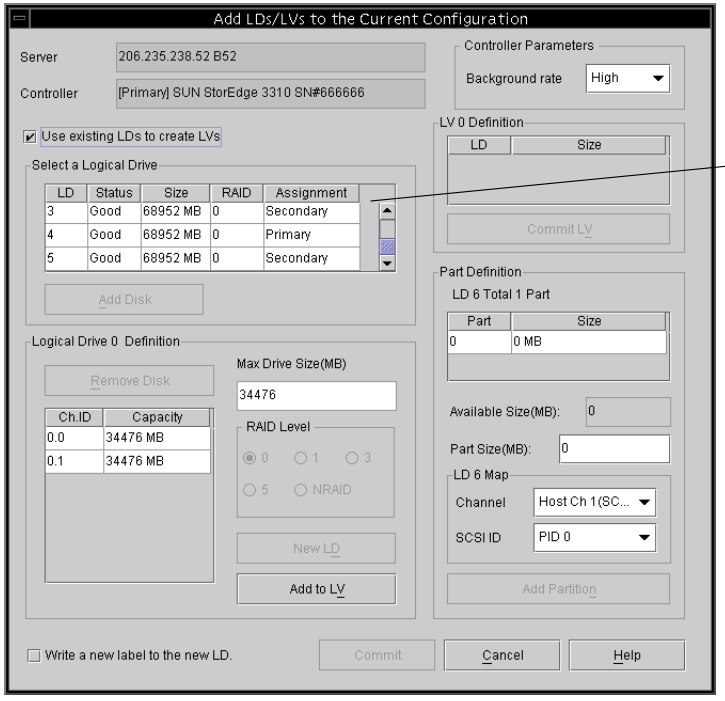
Note – This selection is inactive unless you have selected an array with available physical drives.

3. **Select Add LDs/LVs to the Current Configuration from the Custom Configuration Options window.**
4. **Verify that the server and controller displayed at the top of the window are correct.**
5. **Select Use existing LDs to create LVs.**

   If you do not see any logical drives listed under Select a Logical Drive, the logical drives have not been unmapped and therefore are unavailable to select. You must unmap the logical drives first.
6. **Select a logical drive and click Add to LV.**
7. **When you have finished adding logical drives to the logical volume, to create another logical volume or an individual logical drive, click Commit LV.**

   When you have finished creating logical volumes and do not want to create an individual logical drive, click Commit.

Note – When you are finished creating logical volumes and want to exit the New Configuration window, if you accidentally click Commit LV instead of Commit, you will have to create another logical drive; otherwise, you have to click Cancel and configure the logical volume again.



If no logical drives are listed after you select Use existing LDs to create LVs, the logical drives have not been unmapped. You must first unmap the logical drives.

▼ To Delete a Logical Drive or Logical Volume

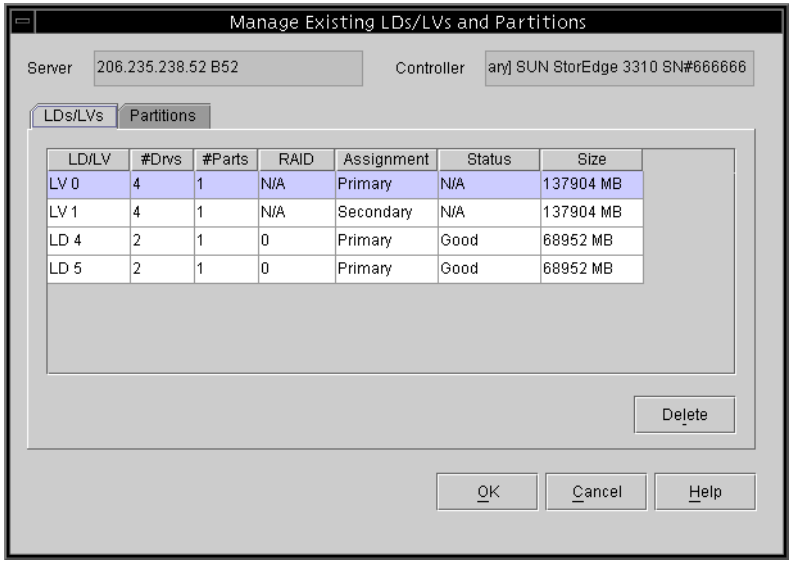
Use this option to delete one or more logical drives or logical volumes from an existing configuration of RAID sets.

Note – Before you can delete a logical drive or logical volume, you need to unmap all assigned LUNs.

1. **Select the appropriate array.**
2. **View the logical drives or logical volumes you want to delete.**

3. **If any of the logical drives or logical volumes have host LUN assignments, proceed to Step 4; if they do not, proceed to Step 8.**
4. **Select Configuration → Custom Configure.**
5. **Select Change Host LUN Assignments.**
6. **Select the host LUNs attached to the logical drive or logical volume you want to unmap, and click Unmap Host LUN.**
7. **Click OK, and then click Close.**
8. **Select Configuration → Custom Configure.**
9. **Select Manage Existing LDs/LVs and Partitions from the Custom Configuration Options window.**
10. **Select the LDs/LVs tab.**
11. **Select the logical drive or logical volume you want to delete, and click Delete and click OK.**

    When deleting a logical volume, after you click Delete, the logical volume is deleted, but the logical drives that make up the logical drive are displayed.



12. **Click OK in the Confirm Configuration Operation window to complete the operation, and click Close.**

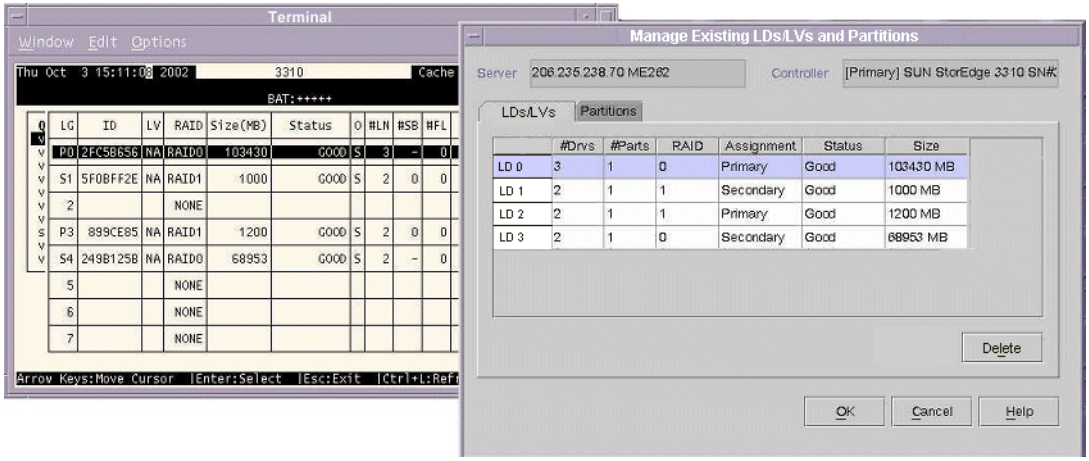
The Logical Drive/Logical Volume Number

The logical drive/logical volume number referenced with each logical drive is dynamic; it changes when logical drives are created/deleted. This number is displayed in the logical drive (LDs/LVs) field of several windows including Dynamically Grow and/or Reconfigure LDs/LVs, Change Host LUN Assignments, Manage Existing LDs/LVs and Partitions, and the main window.

Used strictly as a placeholder that enables you to *visually* keep track of logical drives and logical volumes, this number is insignificant to the controller. That is, the controller does not report on the logical drives or logical volumes according to this number. For example, if four logical drives exist, and LD2 is deleted, the existing LD3 dynamically changes to LD2, and LD4 changes to LD3. Only the LD/LV number changes; all LUN mapping and data on the logical drives remains unchanged.

Because the controller reports on the *total number* of logical drives, which in this case is three, the actual LD/LV number as displayed in the LD/LV field is irrelevant. In this example, if a new logical drive is created, it takes the LD number of the logical drive that was deleted, and the controller reports that there are a total of four logical drives. All existing logical drives return to their original primary/secondary designation.

Note – As shown in the following example, the LG number on the firmware terminal menu option View and Edit Logical Drives is *not* visually dynamic. After a logical drive is deleted, you see an empty placeholder. When a logical drive is created from the console or from the terminal, this empty placeholder is filled with the new logical drive.


Terminal
Window Edit Options
Thu Oct 3 15:11:08 2002
3310
Cache
BAT:+++++
LG ID LV RAID Size(MB) Status O #LN #SB #FL
P0 2FC5B656 NA RAID0 103430 GOOD S 3 - 0
S1 5F0BFF2E NA RAID1 1000 GOOD S 2 0 0
2 NONE
P3 899CE85 NA RAID1 1200 GOOD S 2 0 0
S4 249B125B NA RAID0 68953 GOOD S 2 - 0
5 NONE
6 NONE
7 NONE
Arrow Keys:Move Cursor |Enter:Select |Esc:Exit |Ctrl+L:Refr
Manage Existing LDs/LVs and Partitions
Server 206.235.238.70 ME262
Controller [Primary] SUN StorEdge 3310 SN#
LDs/LVs
Partitions
#Drvs #Parts RAID Assignment Status Size
LD 0 3 1 0 Primary Good 103430 MB
LD 1 2 1 1 Secondary Good 1000 MB
LD 2 2 1 1 Primary Good 1200 MB
LD 3 2 1 0 Secondary Good 68953 MB
Delete
OK
Cancel
Help

The LD field in the Manage Existing LDs/LVs and Partitions window (right) is dynamic; it changes when logical drives are created/deleted. In this example, LD2 was deleted and LD4 became LD3 and LD 2 became LD1. In the terminal menu option View and Edit Logical Drives (left), the LG field is not dynamic; an empty slot indicates that LD2 was deleted.

▼ To Create a Partition

Note – Before you can create a partition, you need to unmap all assigned LUNs.

1. **Select the appropriate array.**
2. **View the logical drive(s) you want to create partition(s) on.**
3. **If any of these logical drives have host LUN assignments, proceed to Step 4; if they do not, proceed to Step 8.**
4. **Select Configuration → Custom Configure.**
5. **Select Change Host LUN Assignments.**
6. **Select the Host LUN(s) that are attached to the logical drive(s) you want to partition, and click Unmap Host LUN.**
7. **Click OK, and then click Close.**
8. **Select Configuration → Custom Configure.**
9. **Select Manage Existing LDs/LVs and Partitions from the Custom Configuration Options window.**

10. **Select the Partitions tab.**

11. **Select a logical drive or logical volume you want to partition.**

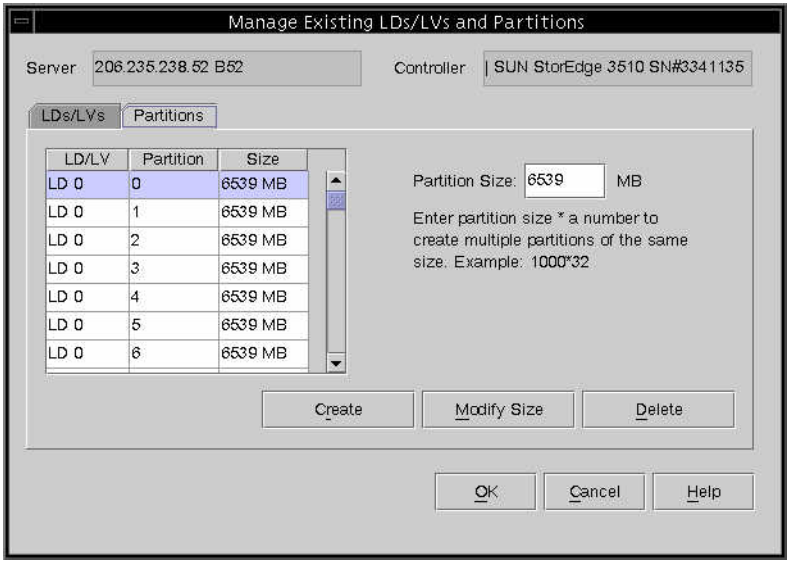
12. **Specify the Partition Size in Mbyte and click Create.**

    To create multiple partitions of the same size, click Add Partition as many times as partitions you want to create. You can also type the partition size in the Part Size field and multiply (*) it by the number of partitions you want to create, for example 100*128. Any remaining MB is added to the last partition.

    As you add partitions, the remaining capacity displayed in Available Size (MB) decreases by the amount of the partition size.

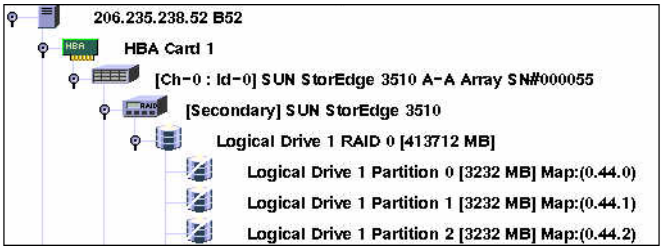
13. **To change the size of a partition you have already created, select the logical drive or logical volume, and click Modify Size.**

14. **Specify the new size (in Mbyte) in the Partition Size field, and click OK.**



15. **Click OK in the Confirm Configuration Operation window to complete the operation, and click Close.**

    After a logical drive or logical volume has been partitioned, when you open a logical drive or logical volume on the main window, the partitions are displayed .


206.235.238.52 B52
HBA Card 1
[Ch-0 : Id-0] SUN StorEdge 3510 A-A Array SN#000055
[Secondary] SUN StorEdge 3510
Logical Drive 1 RAID 0 [413712 MB]
Logical Drive 1 Partition 0 [3232 MB] Map:(0.44.0)
Logical Drive 1 Partition 1 [3232 MB] Map:(0.44.1)
Logical Drive 1 Partition 2 [3232 MB] Map:(0.44.2)

The Logical Drive/Logical Volume Number

For important information regarding the logical drive/logical volume number displayed in the LDs/LVs field in the Manage Existing LDs/LVs and Partitions window, see "The Logical Drive/Logical Volume Number" on page 158.

▼ To Delete a Partition

Note – To delete a partition on a logical drive or logical volume, you need to unmap all assigned LUNs.

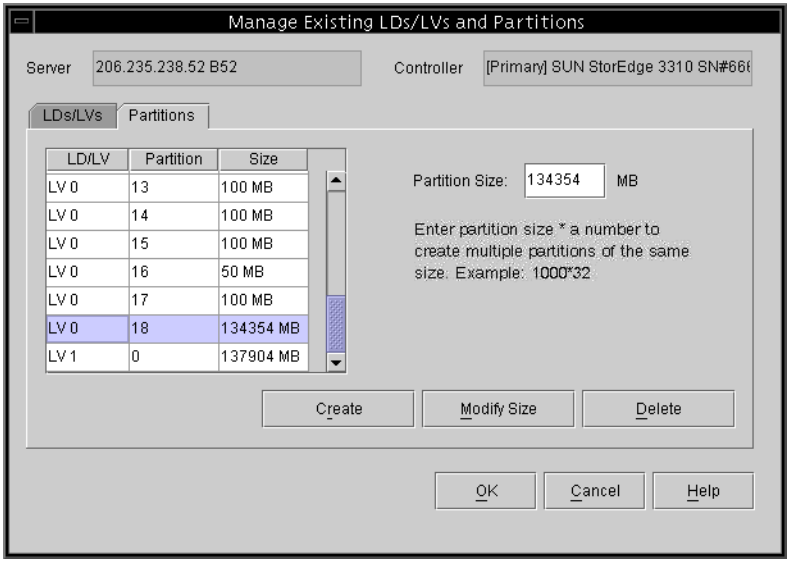
---

1. **Select the appropriate array.**
2. **View the logical drives or logical volumes on which you want to delete the partitions.**

   If any of the partitions on the drive have host LUN mappings, proceed to Step 3; if they do not, proceed to Step 7.
3. **Select Configuration → Custom Configure.**
4. **Select Change Host LUN Assignments.**
5. **Select the LUNs that are mapped to the logical drive's or logical volume's partitions that you want to delete, and click Unmap Host LUN.**
6. **Click OK, and then click Close.**
7. **Select Configuration → Custom Configure.**
8. **Select Manage Existing LDs/LVs and Partitions from the Custom Configuration Options window.**
9. **Select the Partitions tab.**

10. **Select a partition to modify or delete by starting from the last partition within the logical drive or logical volume.**

11. **Click Delete, and then click OK.**



12. **Click OK in the Confirm Configuration Operation window to complete the operation, and click Close.**

▼ To Expand the Capacity of a Logical Drive or Logical Volume

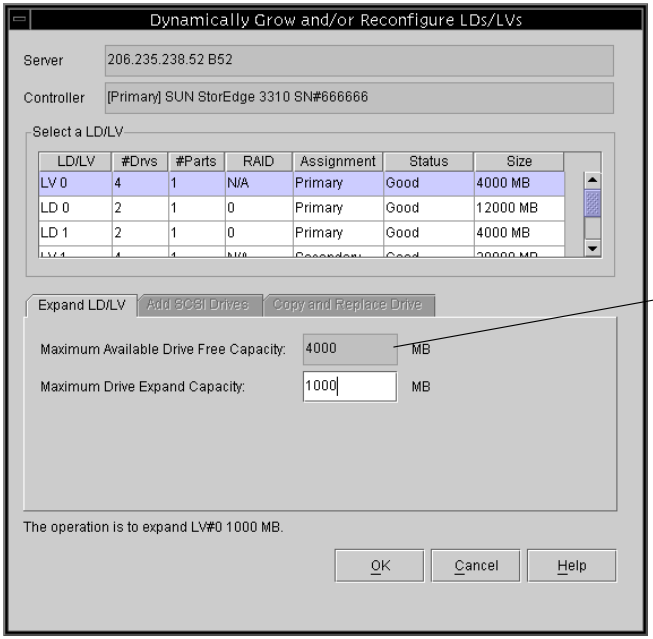
Use this option to expand the capacity of an existing logical drive or logical volume. For example, you might originally have had an 18-Gbyte drive of which only 9 Gbyte were selected to build a logical drive. To use the remaining 9 Gbyte, you need to expand the logical drive.

Note – To expand a logical volume, you must first expand the logical drives that make up the logical volume.

---

1. **Select the appropriate array.**
2. **Select Configuration → Custom Configure.**
3. **Select Dynamically Grow and/or Reconfigure LDs/LVs from the Custom Configuration Options window.**
4. **Select the logical drive or logical volume you want to expand.**
5. **Select the Expand LD/LV tab.**
6. **Specify the capacity in Mbyte by which you want to expand the logical dive or logical volume in the Maximum Drive Expand Capacity field, and click OK.**

   The Maximum Drive Expand Capacity cannot exceed the Maximum Available Drive Free Capacity.



If you used the full capacity of the logical drive when it was created, 0 is displayed; there is no room to expand unless you add another logical drive.

7. **Click OK in the Confirm Configuration Operation window to complete the operation, and click Close.**

The Logical Drive/Logical Volume Number

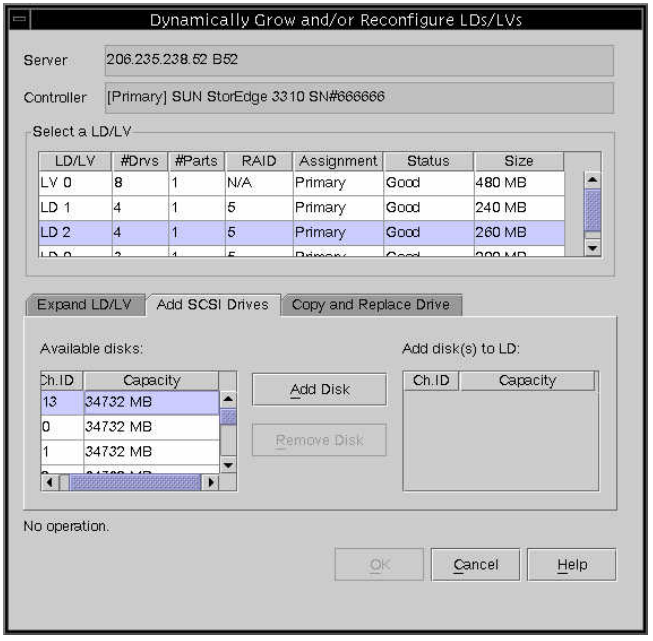
For important information regarding the logical drive/logical volume number displayed in the LD/LV field in the Dynamically Grow and/or Reconfigure LDs/LVs window, see “The Logical Drive/Logical Volume Number” on page 158.

▼ To Add SCSI Drives to an Existing Logical Drive

1. **Select the appropriate array.**
2. **Select Configuration → Custom Configure.**
3. **Select Dynamically Grow and/or Reconfigure LDs/LVs from the Custom Configuration Options window.**
4. **Select the logical drive to which you want to add a SCSI drive.**
5. **Select the Add SCSI Drives tab.**
6. **From the list of Available disks, select the drive you want to add to the logical drive.**
7. **Click Add Disk.**

   The drive is moved to the Add disk(s) to LD list.

   If you make a mistake or change your mind, select the disk from the Add disk(s) to LD list and click Remove.
8. **When you are finished adding the SCSI drives, click OK.**



9. **Click OK in the Confirm Configuration Operation window to complete the operation, and click Close.**

The Logical Drive/Logical Volume Number

For important information regarding the logical drive/logical volume number displayed in the LD/LV field in the Dynamically Grow and/or Reconfigure LDs/LVs window, see "The Logical Drive/Logical Volume Number" on page 158.

▼ To Copy and Replace Member Drives

You can copy and replace existing member drives with drives of higher capacity. For example, a logical drive that originally contains three member drives, each of which has a capacity of 18 Gbyte, can be replaced with new member drives each with a capacity of 36 Gbyte, as illustrated in the following figure.

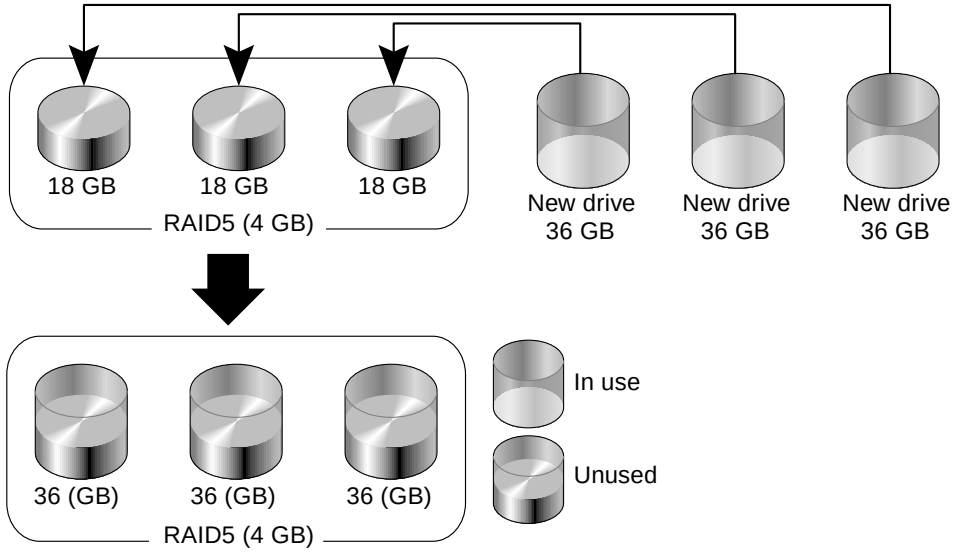


FIGURE 11-1 Copying and Replacing Member Drives

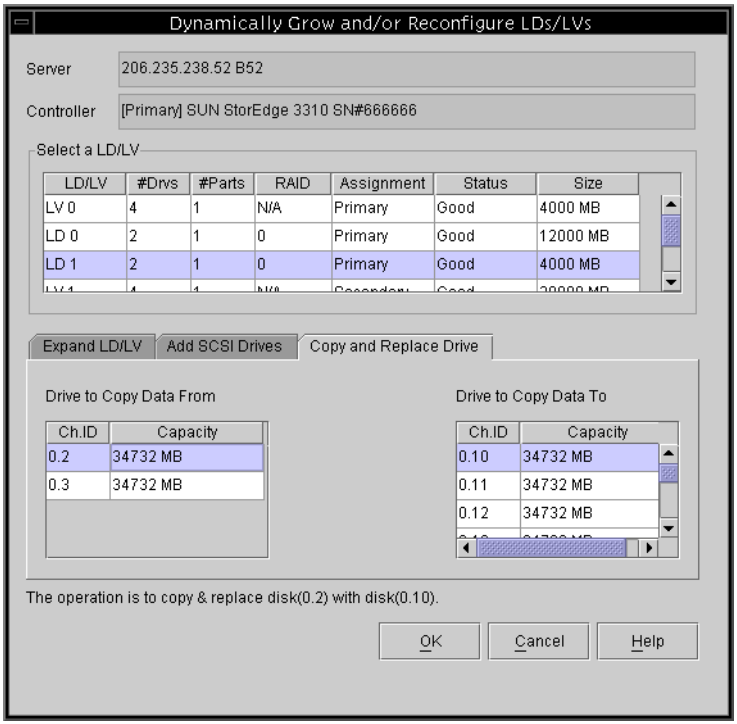
1. **Select the appropriate array.**
2. **Select Configuration → Custom Configure.**
3. **Select Dynamically Grow and/or Reconfigure LDs/LVs from the Custom Configuration Options window.**

4. **Select the logical drive for which you are going to perform the copy and replace operation.**

5. **Select the Copy and Replace Drive tab on the Dynamically Grow and/or Reconfigure LDs/LVs window.**

6. **From the Drive to Copy Data From list, select the new hard drive.**

7. **From the Drive to Copy Data To list, select the hard drive that is going to be replaced, and click OK.**



To use the additional capacity provided by the new drives, follow the instructions in “To Expand the Capacity of a Logical Drive or Logical Volume” on page 163.

8. **Click OK in the Confirm Configuration Operation window to complete the operation, and click Close.**

9. **When the operation is complete, close the progress window.**

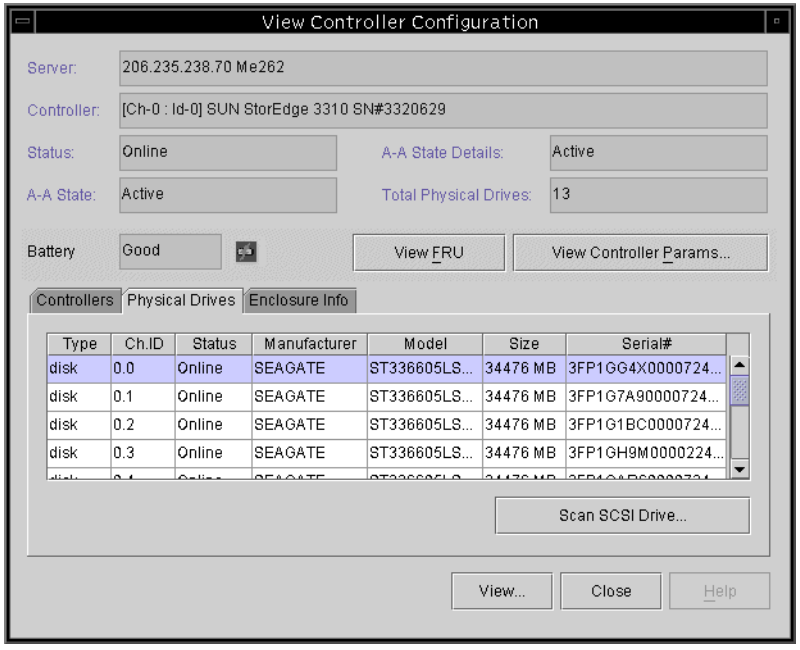
The Logical Drive/Logical Volume Number

For important information regarding the logical drive/logical volume number displayed in the LD/LV field in the Dynamically Grow and/or Reconfigure LDs/LVs window, see “The Logical Drive/Logical Volume Number” on page 158.

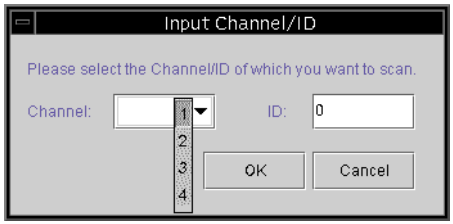
▼ To Scan in New Hard Drives

A hard drive can be scanned in and made available without having to shut down the array.

1. **Double-click the appropriate array.**
2. **The View Controller Configuration window is displayed.**
3. **Select the Physical Drives tab, and click Scan SCSI Drive.**



4. **Select the correct Channel and ID that the drive was input on.**



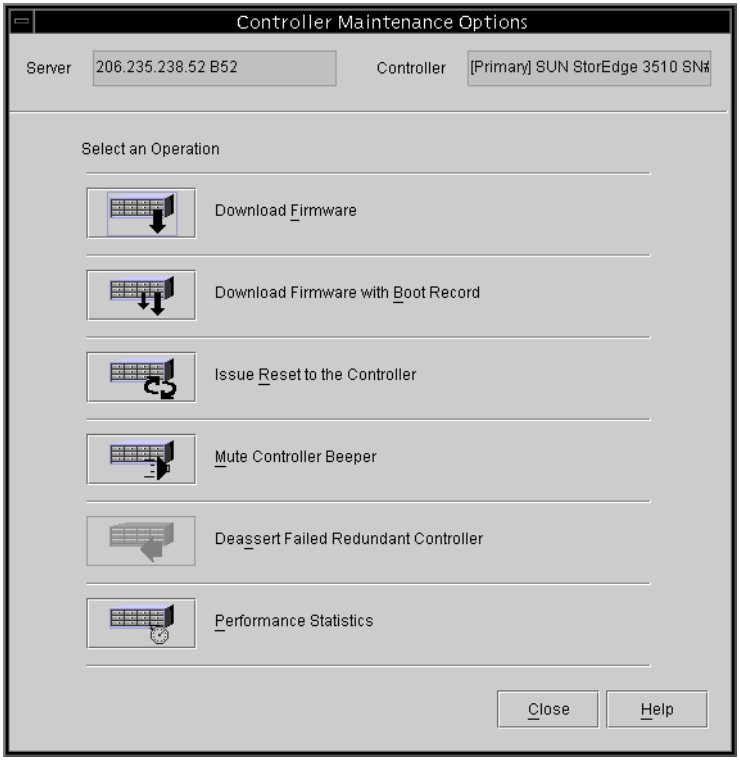
If the scan was successful, the drive is appropriately displayed and made available.

▼ To Download RAID Controller Firmware

The following procedures are used to upgrade the controller firmware for both a single and redundant controller configuration.

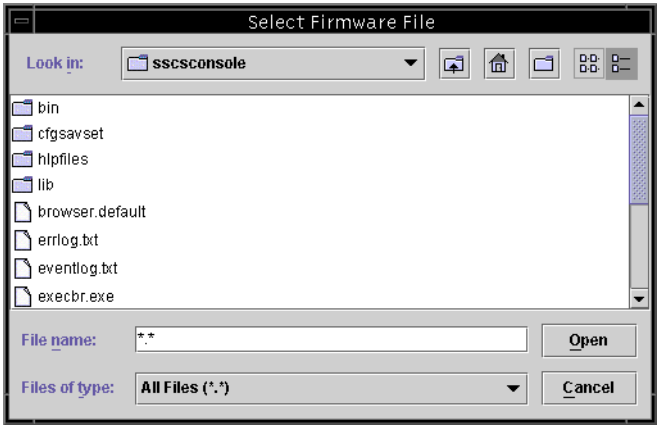
1. **Select the desired controller icon in the main window.**
2. **Select Array Administration → Controller Maintenance.**
3. **If you are not already logged in as** `ssconfig`**, a password prompt is displayed; type the** `ssconfig` **password.**

   The Controller Maintenance Options window is displayed.



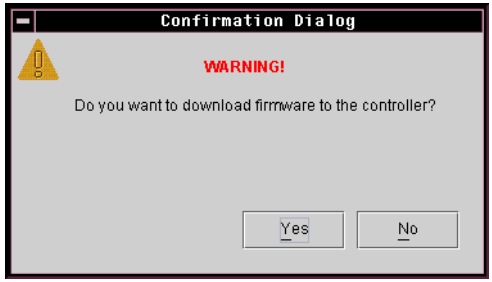
4. **If upgrading firmware only (not boot record), select the Download Firmware option.**

   The Select Firmware File window is displayed.



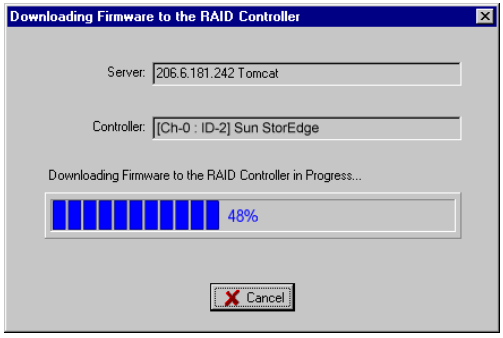
5. **Select the firmware you want to download, and click Open.**

   The Confirmation Dialog prompt is displayed.



6. **Click Yes.**

   The firmware download to the RAID controller displays a progress bar.


Downloading Firmware to the RAID Controller
Server: 206.6.181.242 Tomcat
Controller: [Ch-0 : ID-2] Sun StorEdge
Downloading Firmware to the RAID Controller in Progress...
48%
Cancel

7. **When the progress bar reaches 100%, click OK.**

8. **After the firmware has been downloaded, check the settings to make sure they are configured correctly.**

▼ To Upgrade Firmware and Boot Record

1. **Go to Array Administration → Controller Maintenance.**
2. **If you are not already logged in as `ssconfig`, a password prompt is displayed; type the `ssconfig` password.**

   The Controller Maintenance Options window is displayed.
3. **Select Download Firmware with Boot Record.**

   The Select Boot Record File window is displayed.

4. **Select the boot record and click Open.**
5. **Select the appropriate firmware file.**

   The Select Firmware File is displayed.
6. **Click Open.**

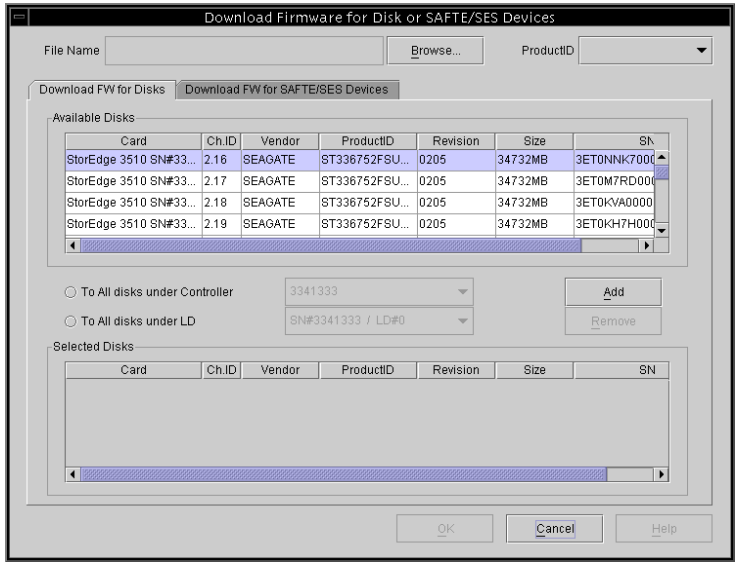
   The Confirmation Dialog window is displayed.
7. **Repeat Steps 6 through 8 in the previous subsection.**

Downloading Firmware for Devices

This option enables you to upgrade the firmware on hard drives and SAF-TE/SES devices.

▼ To Upgrade Firmware on Hard Drives

1. **Select the appropriate array.**
2. **Select Array Administration → Download FW for Devices.**
3. **Click the Download FW for Disks tab.**
4. **Select either To All disks under Controller, and select an array from the menu, or select To All disks under LD, and select the logical drive from the menu.**
   - If there are drives that you do not want the new firmware downloaded to, select them from Selected Disks, and click Remove.
   - If there are logical drives that you want to add, select them from Available Disks and click Add.
   - If you have multiple drives that have different product IDs, make sure you select the product ID for the drive(s) to which you are downloading firmware from the Product ID list box.



5. **Click Browse and locate the download firmware file.**

   Select Open.

6. **Select the download firmware file, click Open, and click OK.**

   The firmware starts to download.

7. **When the progress reaches 100%, click OK.**

8. **To verify that the firmware has downloaded successfully, select View → View Physical Drive, and make sure the firmware version has changed in the Product Revision field.**

▼ To Upgrade Firmware on SAF-TE/SES Devices

Note – SAF-TE devices are used by SCSI arrays and SES devices are used by Fibre Channel arrays.

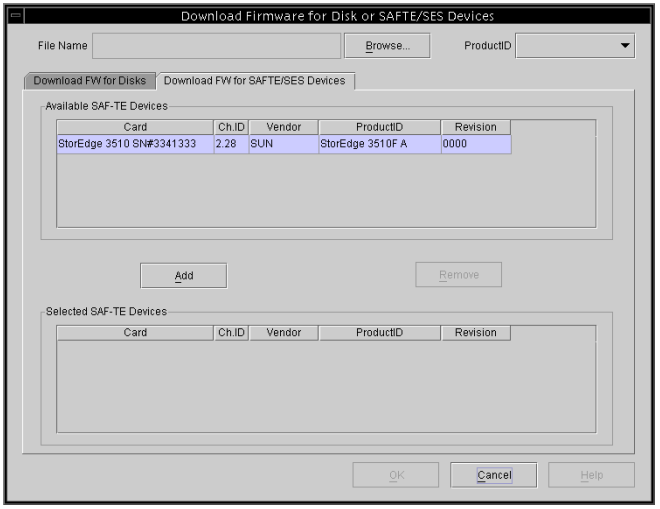
---

1. **Select the array.**

2. **Select Array Administration → Download FW for Devices.**

3. **Click the Download FW for SAFTE/SES Devices tab.**

   - To add a device, select it from Available SAF-TE Devices and click Add.
   - To remove a device, select it from Selected SAF-TE Devices and click Remove.



4. **Click Browse and locate the download firmware file.**
5. **Select the download firmware file, click Open, and click OK.**

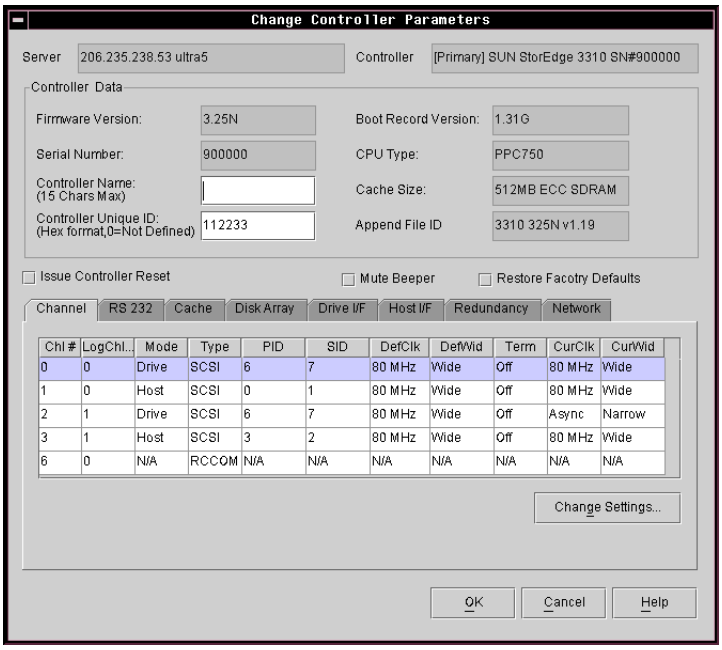
   The firmware starts to download.
6. **When the progress reaches 100%, click OK.**
7. **To verify that the firmware has downloaded successfully, select View → View Enclosure, and make sure the firmware version has changed in the Firmware Rev field.**

▼ To Change Controller Parameters

1. **Select the appropriate array controller from the main menu.**
2. **Select Configuration → Custom Configure.**

   If necessary, log in to the configuration level of the program with the `ssconfig` password. The Custom Configuration Options window is displayed.
3. **From the Custom Configuration Options window, select Change Controller Parameters.**

   The Change Controller Parameters window with the Channel tab selected is displayed.


Change Controller Parameters
Server 206.235.238.53 ultra5
Controller [Primary] SUN StorEdge 3310 SN#900000
Controller Data
Firmware Version: 3.25N
Boot Record Version: 1.31G
Serial Number: 900000
CPU Type: PPC750
Controller Name: (15 Chars Max)
Cache Size: 512MB ECC SDRAM
Controller Unique ID: (Hex format,0=Not Defined) 112233
Append File ID 3310 325N v1.19
Issue Controller Reset
Mute Beeper
Restore Facotry Defaults
Channel RS 232 Cache Disk Array Drive I/F Host I/F Redundancy Network
Chl # LogChl... Mode Type PID SID DefClk DefWid Term CurClk CurWid
0 0 Drive SCSI 6 7 80 MHz Wide Off 80 MHz Wide
1 0 Host SCSI 0 1 80 MHz Wide Off 80 MHz Wide
2 1 Drive SCSI 6 7 80 MHz Wide Off Async Narrow
3 1 Host SCSI 3 2 80 MHz Wide Off 80 MHz Wide
6 0 N/A RCCOM N/A N/A N/A N/A N/A N/A N/A
Change Settings...
OK
Cancel
Help

Note – For the Sun StorEdge 3510 FC array, the CurClk is 2.0 GHz.

- Controller Name – If the controller name needs to be set, select Controller Name and type the desired name. Click OK to save the change.
- Controller Unique ID – This ID is automatically set.

▼ To Save Changed Values

Some of the options on the Change Controller Parameters window require that the controller be reset so that the changes take effect. If a change requires a controller reset, the following message is displayed in the lower left side of the window:

```
[Controller reset is required for changes to take effect.]
```

To reset the controller and save changed values, you can either select the Issue Controller Reset check box at the time of making the change, or reset the controller later through the Controller Maintenance window (see “To Reset the Controller” on page 146.). If you are making multiple changes, you might not want to stop and reset the controller after each change. If you do not select the Issue Controller Reset check box, and the change requires a reset, when you click OK, a warning message is displayed:

Confirmation Dialog
WARNING!
Changes made to this setting will NOT take effect until the controller is RESET. Prior to resetting the controller, the operation may not proceed normally. Do you want to RESET controller?
Yes
No
Cancel

1. **Select the Issue Controller Reset check box.**
2. **Make the changes and click OK.**

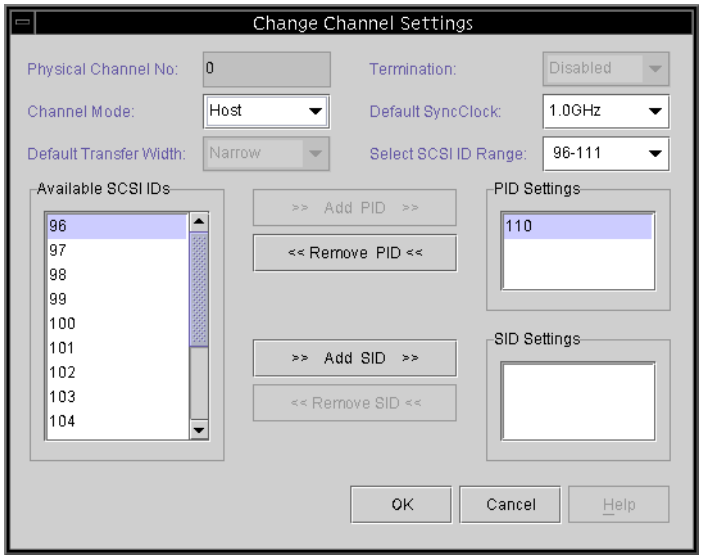
   or

1. **Do not select the Issue Controller Reset check box.**
2. **Make the changes and click OK.**
3. **Reset the controller later as explained in “To Reset the Controller” on page 146**

Channel Tab

1. **From the Channel Settings tab, select the channel to be edited.**
2. **Click Change Settings.**

   The Change Channel Settings window is displayed. For the server to recognize the array, a host channel must have an ID assigned to a logical drive and a logical drive mapped to that host channel and ID. This window enables you to configure the host / drive channel.



3. **From the Channel Mode list box, select either Host or Drive.**

   A Drive channel is what the drives are connected to (internal or external). A Host channel is what is connected to the server.

Note – Depending on the controller configuration, you might need to select both primary and secondary channel IDs as described in the following steps.

---

4. **From the Available SCSI IDs list box, first select the primary channel ID, which is designated as PID. Then click Add PID.**
5. **If you have two controllers installed, select a secondary channel ID from the Available SCSI IDs list box, and click Add SID.**
6. **For changes to take effect, reset the controller.**

1. **If you want an ID higher than 15, click Select SCSI ID Range and select the desired range.**

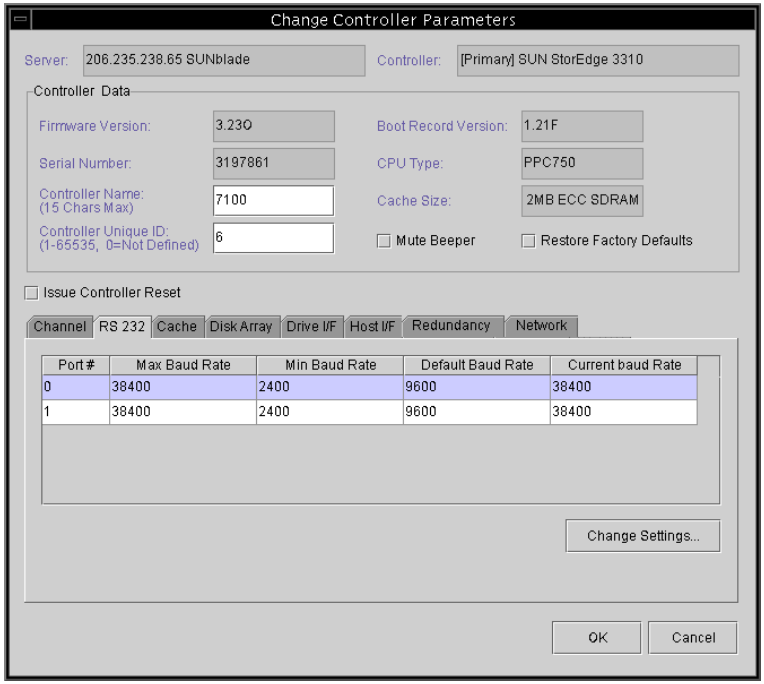
Note – Each channel's ID must be within the same range.

---

2. **Click Remove to remove the PID or SID.**
3. **Once your selections have been made, click OK to redisplay the previous window.**

RS 232 Tab

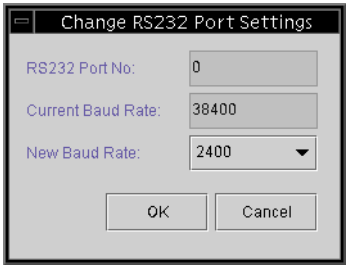
1. **After all channel settings have been made, from the Change Controller Parameters window, select the RS 232 tab.**



2. **Select the port desired, and click Change Settings.**

   The Change RS232 Port Settings window is displayed.

3. **Select any baud rate desired including the default setting of 9600, and then click OK to return to the previous window.**



Cache Tab

Optimization

From the Cache tab, you can select the optimization mode for the logical drive, which indicates the amount of data that is written across each drive in an array. Sequential I/O indicates large blocks of data (128 Kbyte). Random I/O indicates small blocks of data (32 Kbyte).

The type of application the array is working with determines whether Random or Sequential I/O should be applied. Video/imaging application I/O size can be 128, 256, 512 Kbyte, or up to 1 Mbyte, so the application reads and writes data to and from the drive as large-block, sequential files. Database/transaction-processing applications read and write data from the drive as small-block, randomly-accessed files.

There are two limitations that apply to the optimization modes:

- One optimization mode must be applied to all logical drives in an array.
- Once the optimization mode is selected and data written to logical drives, the only way to change the optimization mode is to back up all data to another location, delete all logical configurations of drives, reconfigure the logical drive with the new optimization mode, and reboot the array.

Note – The maximum allowable size of a logical drive optimized for Sequential I/O is 2 Tbyte. The maximum allowable size of a logical drive optimized for Random I/O is 512 Gbyte. When creating a logical drive that is greater than these limits, an error message is displayed.

Maximum Number of Disks and Maximum Usable Capacity for Random and Sequential Optimization

Your choice of Random or Sequential optimization affects the maximum number of disks you can include in an array and the maximum usable capacity of a logical drive. The following tables contain the maximum number of disks per logical drive and the maximum usable capacity of a logical drive.

Note – You can have a maximum of eight logical drives and 36 disks, using one array and two expansion units.

TABLE 11-1 Maximum Number of Disks per Logical Drive for a 2U Array

Disk Capacity (GB)	RAID 5 Random	RAID 5 Sequential	RAID 3 Random	RAID 3 Sequential	RAID 1 Random	RAID 1 Sequential	RAID 0 Random	RAID 0 Sequential
36.2	14	31	14	31	28	36	14	36
73.4	7	28	7	28	12	30	6	27
146.8	4	14	4	14	6	26	3	13

TABLE 11-2 Maximum Usable Capacity (Gbyte) per Logical Drive for a 2U Array

Disk Capacity	RAID 5 Random	RAID 5 Sequential	RAID 3 Random	RAID 3 Sequential	RAID 1 Random	RAID 1 Sequential	RAID 0 Random	RAID 0 Sequential
36.2	471	1086	471	1086	507	543	507	1122
73.4	440	1982	440	1982	440	1101	440	1982
146.8	440	1908	440	1908	440	1908	440	1908

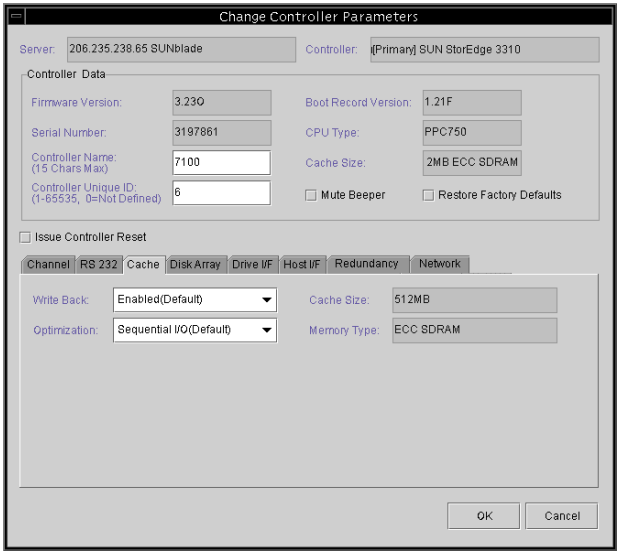
Note – You might not be able to use all disks for data when using 36 146-Gbyte disks. Any remaining disks can be used as spares.

Write-Back Cache

Write-back is a cache-writing strategy in which the controller receives the data to be written to disk, stores it in the memory buffer, and immediately sends the host operating environment a signal that the write operation is complete, without waiting until the data is actually written to the disk drive. Write-back caching improves the performance of write operations and the throughput of the controller card. Write-through is a cache-writing strategy in which the controller writes the data to the disk drive before signaling the host operating environment that the process is complete. Write-through has lower write operation and is considered more secure if power failure should occur. Because a battery module is installed, power is supplied to the data cached in memory and the cached writes can be completed when power is restored.

1. **From the Change Controller Parameters window, select the Cache tab.**
2. **Select Optimization from the list box or accept the current setting.**
3. **To specify Write Back cache, click the list box and select Enabled.**

   If Write Back is disabled, Write-Through is the selected cache-writing strategy.
4. **For changes to take effect, reset the controller.**



Disk Array Tab

1. **From the Change Controller Parameters window, select the Disk Array tab.**
2. **Select either Disabled or Enabled from the three Write Verify list boxes.**

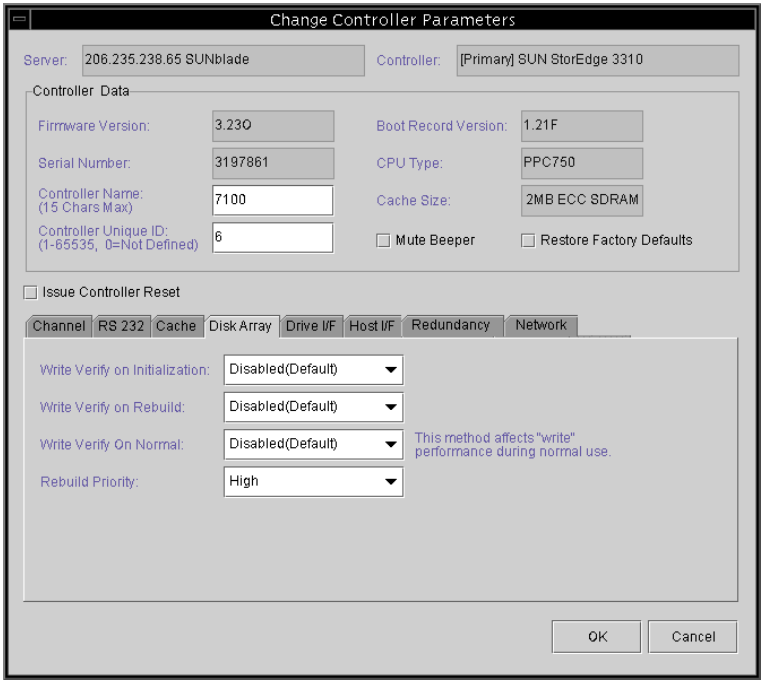
   Normally, errors might occur when a hard drive writes data. To avoid the write error, the controller can force the hard drives to verify the written data.

   - Write Verify on Initialization - performs verify-after-write while initializing the logical drive.
   - Write Verify on Rebuild – performs verify-after-write during the rebuilding process.
   - Write Verify on Normal – performs verify-after-write during normal I/O requests.

3. **Select from the four options available in the Rebuild Priority list box: Low, Normal, Improved, or High.**

   The RAID controller provides a background rebuilding ability. This means the controller is able to serve other I/O requests while rebuilding the logical drives. The time required to rebuild a drive set largely depends on the total capacity of the logical drive being rebuilt. Additionally, the rebuilding process is totally transparent to the host computer or the operating environment.

   - Low – the default that uses the controller's minimum resources to rebuild
   - Normal – to speed up the rebuilding process
   - Improved – to allocate more resources to the rebuilding process
   - High – to use the controller's maximum resources to complete the rebuilding process in the shortest time possible



Drive I/F Tab

1. **From the Change Controller Parameters window, select the Drive I/F tab.**

2. **From the SCSI Motor Spin Up field, select either Disabled or Enabled.**

   The SCSI Motor Spin Up decides how the SCSI drives in a Disk Array are started. When the power supply is unable to provide sufficient current for the hard drives and controllers that are powered up at the same time, spinning up the hard drives serially is one of the best ways to consume lower powerup current. By default, all hard drives spin-up when powered on.

3. **From the Power Up SCSI Reset field, select either Enabled or Disabled.**

   By default, when the controller is powered up, it sends a SCSI bus reset command to the SCSI bus. When disabled, it does not send a SCSI bus reset command on the next power up.

   When connecting dual host computers to the same SCSI bus, the SCSI bus reset interrupts all the read/write requests being performed. This might cause some operating environments or host computers to act abnormally. Disable Power Up SCSI Reset at power up to avoid this situation.

4. **Set the Disk Access Latency.**

   This function sets the delay time before the controller tries to access the hard drives after power on. The default is 15 seconds.

5. **Set the Tag Count Per drive.**

   This is the maximum number of tags that can be sent to each drive at the same time. A drive has a built-in cache that is used to sort all of the I/O requests (tags) that are sent to the drive, enabling the drive to finish the requests faster.

   The cache size and maximum number of tags varies between different brands and models of drive. Use the default setting of 32. Changing the maximum tag count to Disable causes the internal cache of the drive to be ignored (not used).

   The controller supports tag command queuing with an adjustable tag count from 1 to 128.

6. **From the SAF-TE Polling Period (Sec) field, select the variable time options shown in the list box, or select 0.0 to disable this function so that all installed Event Recording Modules (ERMs) are never polled.**

7. **From the SCSI I/O Timeout (Sec) field, select from 0.5 through 30 seconds.**

   The SCSI I/O Timeout is the time interval for the controller to wait for a drive to respond. If the controller attempts to read data from or write data to a drive but the drive does not respond within the SCSI I/O timeout value, the drive is considered a failed drive.

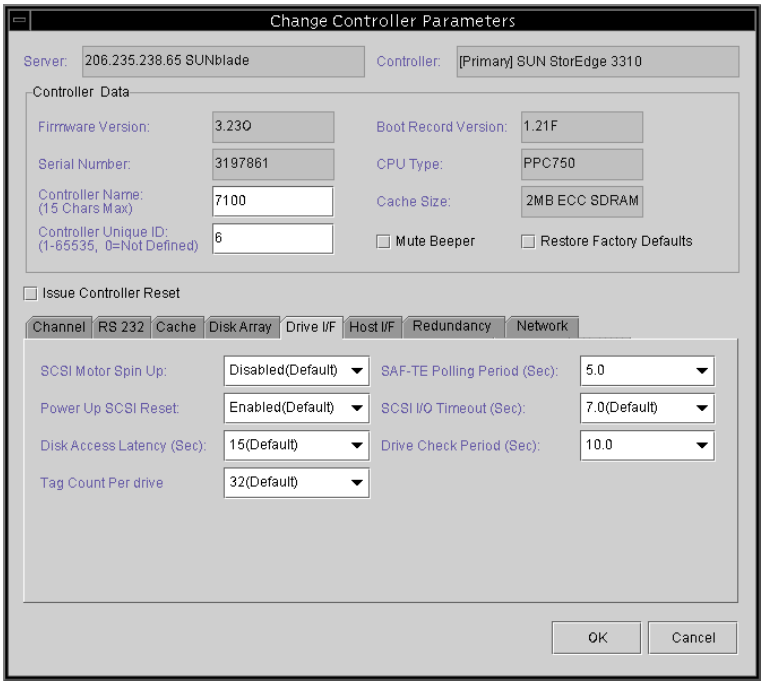
   The default setting for SCSI I/O Timeout is 30 seconds for Fibre Channel and 15 seconds for SCSI. Do not change this setting. Setting the timeout to a lower value causes the controller to judge a drive as failed while a drive is still retrying or while a drive is unable to arbitrate the SCSI bus. Setting the timeout to a greater value causes the controller to keep waiting for a drive, and it might sometimes cause a host timeout.

   When the drive detects a media error while reading from the drive platter, it retries the previous reading or recalibrates the head. When the drive encounters a bad block on the media, it reassigns the bad block to another spare block on the same disk drive. However, all of this takes time. The time to perform these operations can vary between different brands and models of drives.

   During SCSI bus arbitration, a device with higher priority can use the bus first. A device with lower priority sometimes receives a SCSI I/O Timeout when devices of higher priority keep using the bus.

8. **From the Drive Check Period (Sec) field, select from 0.5 through 30 seconds.**

   The Periodic Drive Check Time is an interval for the controller to check the drives on the SCSI bus. The default value is Disabled, which means if there is no activity on the bus, the controller does not know if a drive has failed or has been removed. Setting an interval enables the program to detect a drive failure when there is no array activity; however, performance is degraded.



Host I/F Tab

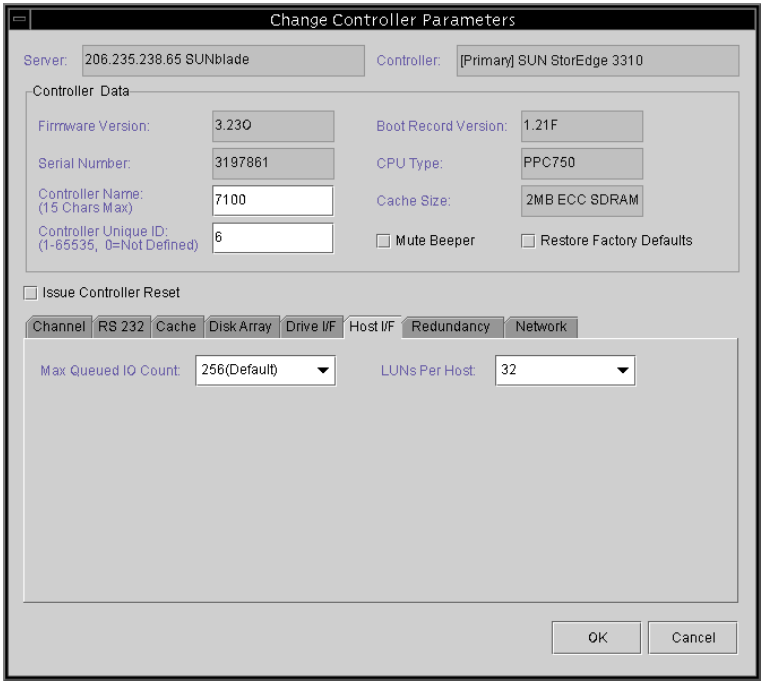
1. **From the Change Controller Parameters window, select the Host I/F tab.**
2. **Set the Max Queued IO Count.**

   This function enables you to configure the maximum size of the I/O queue the controller can accept from the host computer by byte size. The default is 256. The predefined range is from 1 to 1024 bytes, or you might choose the Auto Computer (Automatically Configured) mode.

3. **Set the LUNs Per Host.**

   This function is used to change the number of LUNs per host SCSI ID. The default setting is 32 LUNs, with a predefined range of 1 to 32 LUNs available.

4. **For changes to take effect, reset the controller.**



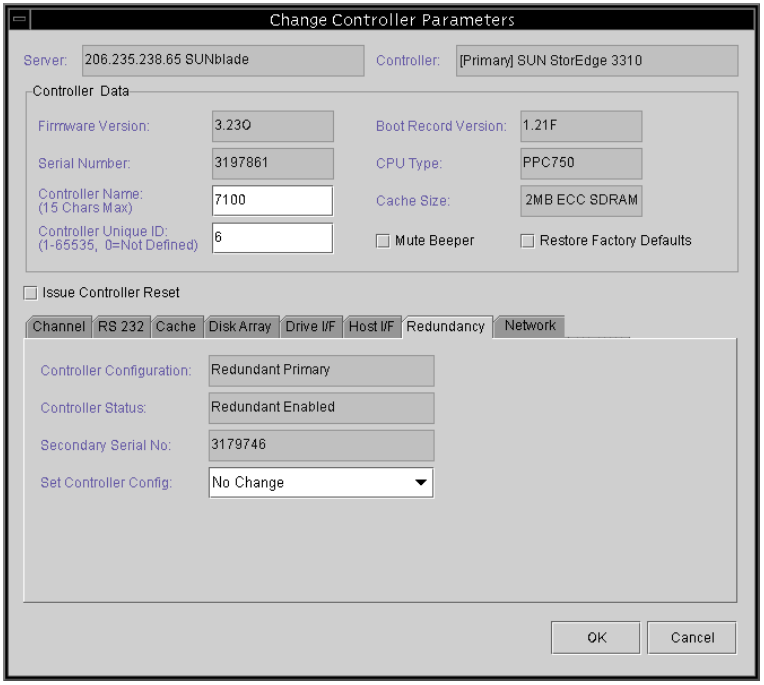
Redundancy Tab

1. **From the Change Controller Parameters window, select the Redundancy tab.**

   Three read-only fields are displayed: Controller Configuration, Controller Status, and Secondary Serial No.

2. **Select an option from the Set Controller Config field.**

   - Redundant Deassert Reset – if you have failed a controller and want to bring it back online.
   - Redundant Force Sec Fail – if you want to force the secondary controller to fail.
   - Redundant Force Pri Fail – if you want to force the primary controller to fail.



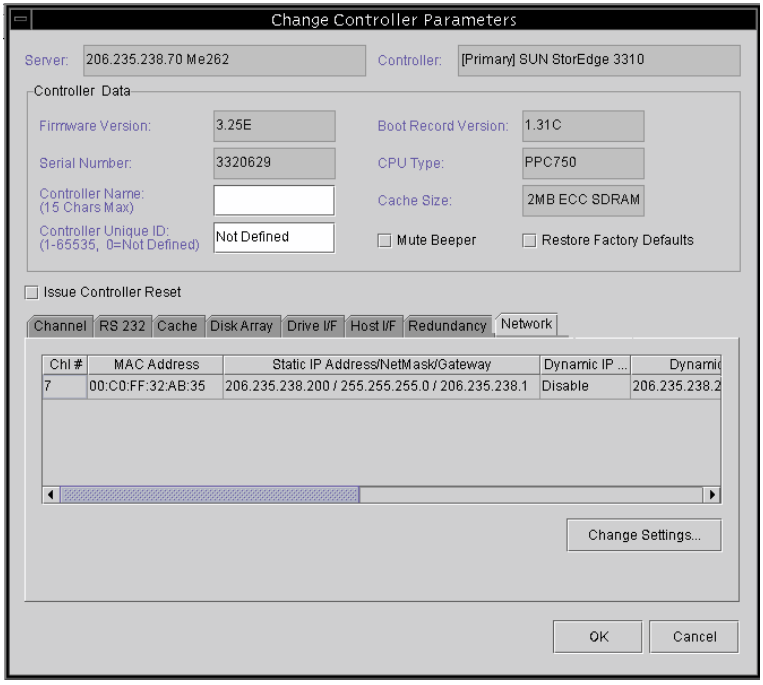
Note – Set both controllers in the Redundant Primary configuration. The controllers then determine which one is primary and which one is secondary. This prevents any possible conflicts between controllers.

---

3. **For changes to take effect, reset the controller.**
4. **Click OK to return to the main menu.**

Network Tab

1. **From the Change Controller Parameters window, select the Network tab.**
2. **To manually configure an IP address, subnet mask, or gateway address, click Change Settings.**
3. **If you have set up an array in an environment with a DHCP/RARP Server, you can select Enable Dynamic IP Assignment to enable the array to automatically obtain an IP address from the network.**



▼ To Mute the Controller Beeper

When an event occurs that causes the controller to beep, for example, when a logical drive fails, during a rebuild, or when adding a SCSI drive, you can mute the beeper in one of two ways.

1. **Select the desired controller icon in the main window.**
2. **Select Array Administration → Controller Maintenance.**
3. **If you are not already logged in as `ssconfig`, a password prompt is displayed; type the `ssconfig` password.**

   The Controller Maintenance Options window is displayed.
4. **Click Mute Controller Beeper.**

   or

1. **Select the desired controller icon in the main window.**
2. **Select Configuration → Custom Configure.**

3. **Select Change Controller Parameters.**
4. **Select Mute Beeper.**

▼ To Assign or Change Standby Drives

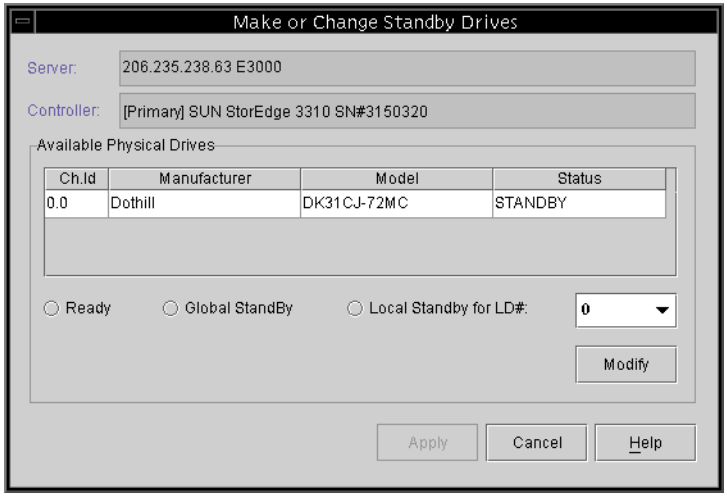
A standby drive acts as a spare to support automatic data rebuilding after a physical drive in a fault tolerant (non-RAID 0) logical drive fails. For a standby drive to take the place of another drive, it must be at least equal in size to the failed drive and all of the logical drives dependent on the failed disk must be redundant (RAID 1, 3, 5, or 1+0).

With this function you can either assign a global or local standby drive or change a ready drive's state to standby or a standby drive's state to ready. A drive that is assigned as a global spare rebuilds if a member of any existing drive fails. You can have one or more standby drives associated with an array controller. A local spare has to be assigned to a particular logical drive and only rebuilds for a member within that logical drive.

1. **In the main window, select the desired array controller.**
2. **Select Configuration → Custom Configure or click the Custom Configuration tool.**

   If necessary, log into the configuration level of the program with the `ssconfig` password. The Custom Configuration Options window is displayed.
3. **Select Make or Change Standby Drives from the Custom Configuration Options window.**

   The Make or Change Standby Drives window is displayed.



4. **Check the server and the controller IDs at the top of the window.**

   If you want to select a different server or controller, click Cancel to return to the main window, select the correct server, or controller from the tree view, and repeat Steps 2 and 3.

5. **Select a drive to be assigned or changed.**

6. **Change or assign the drive's state by selecting Ready, Global StandBy, or StandBy for LD# (local).**

7. **Click Modify.**

8. **Click Apply, and then click Close.**

9. **Whenever you make changes to the configuration, save the new configuration to a file. (For details, see "Configuration File" on page 85).**

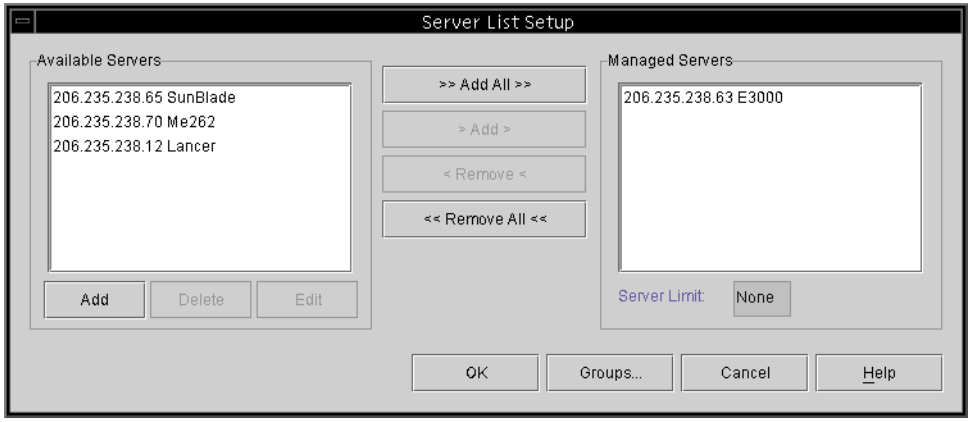
Available Servers

Occasionally, you might need to edit or delete an entry from the Available or Managed Servers lists in the Server List Setup window.

▼ To Edit a Server Entry

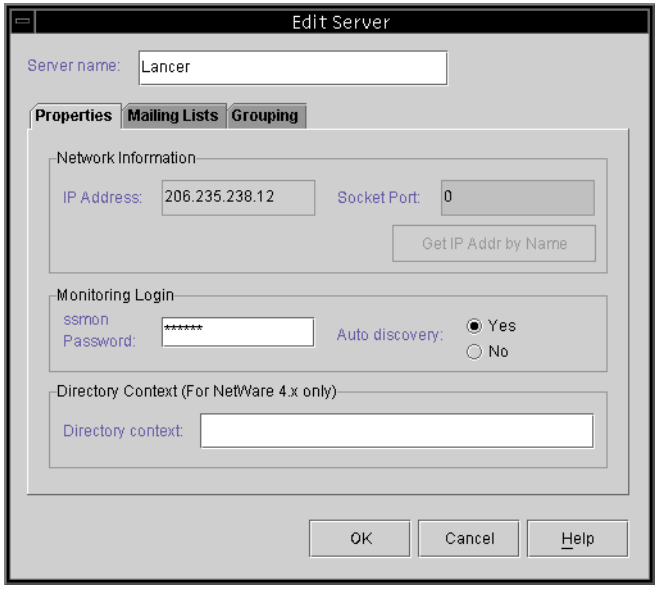
1. **Select File → Server List Setup. The Server Setup window is displayed.**

   If necessary, move the server name from the Managed Servers list to the Available Servers list in the Server List Setup window. Note that only the server entries in the Available Servers list can be edited.



2. **Select the name of the server in the Available Servers list, and click Edit.**

   The Edit Server window is displayed.



3. **Make the necessary changes. Click OK to register your changes.**

   For descriptions of the fields in this window, see “To Add Servers” on page 43. The Add Server and Edit Server windows contain the same fields.

   IP Address Shortcut: If the network address has changed, click Get IP Addr by Name. The program searches for and displays the correct IP address if you typed the name of the server as it is recorded by the name service used by the network.

   If the name used for the server is not the same as the server’s network name or if the naming service is not yet updated, delete the server and add it again.

4. **Move the server name back to the Managed Servers list.**

5. **Click OK to exit the Edit Server window.**

APPENDIX **A**

RAID Basics

This appendix provides background information about RAID including an overview of RAID terminology and RAID levels. Topics covered include the following:

- "RAID Terminology Overview" on page 195
- "RAID Levels" on page 201
- "Local and Global Spare Drives" on page 207

RAID Terminology Overview

Redundant array of independent disks (RAID) is a storage technology used to improve the processing capability of storage systems. This technology is designed to provide reliability in disk array systems and to take advantage of the performance gains offered by an array of multiple disks over single-disk storage.

RAID's two primary underlying concepts are:

- distributing data over multiple hard drives improves performance.
- using multiple drives properly allows for any one drive to fail without loss of data and without system downtime.

In the event of a disk failure, disk access continues normally and the failure is transparent to the host system.

Logical Drive

A logical drive is an array of independent physical drives. Increased availability, capacity, and performance are achieved by creating logical drives. The logical drive appears to the host the same as a local hard disk drive does.

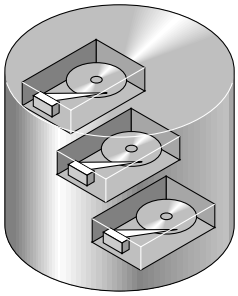


FIGURE A-1 Logical Drive Including Multiple Physical Drives

Logical Volume

A logical volume is composed of two or more logical drives. The logical volume can be divided into a maximum of 32 partitions for SCSI and 128 partitions for Fibre Channel. During operation, the host sees a nonpartitioned logical volume or a partition of a logical volume as one single physical drive.

Local Spare Drive

A local spare drive is a standby drive assigned to serve one specified logical drive. When a member drive of this specified logical drive fails, the local spare drive becomes a member drive and automatically starts to rebuild.

Global Spare Drive

A global spare drive does not only serve one specified logical drive. When a member drive from any of the logical drives fails, the global spare drive joins that logical drive and automatically starts to rebuild.

SCSI Channel

A SCSI channel (SCSI bus) can connect up to 15 devices (excluding the controller itself) when the Wide function is enabled (16-bit SCSI). Fibre Channel enables the connectivity of up to 125 devices in a loop. Each device has one unique SCSI ID.

FIGURE A-2 illustrates this idea. If you file documents into a cabinet, you must put the document into one of the drawers. From a SCSI point of view, a SCSI ID is like a cabinet, and the drawers are the LUNs (logical units). Each SCSI ID enables up to 32 LUNs. Data can be stored into one of the LUNs of the SCSI ID. Most SCSI host adapters treat a LUN like another SCSI device.

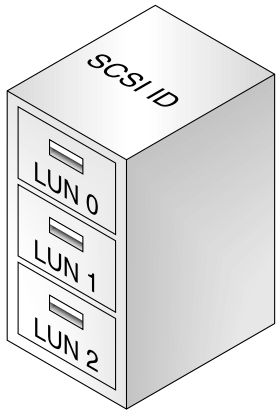


FIGURE A-2 SCSI ID/LUNs

A logical drive consists of a group of SCSI or Fibre Channel drives. Physical drives in one logical drive do not have to come from the same SCSI channel. Also, each logical drive can be configured for a different RAID level.

A drive can be assigned as the local spare drive to one specified logical drive, or as a global spare drive. A spare is not available for logical drives that have no data redundancy (RAID 0).

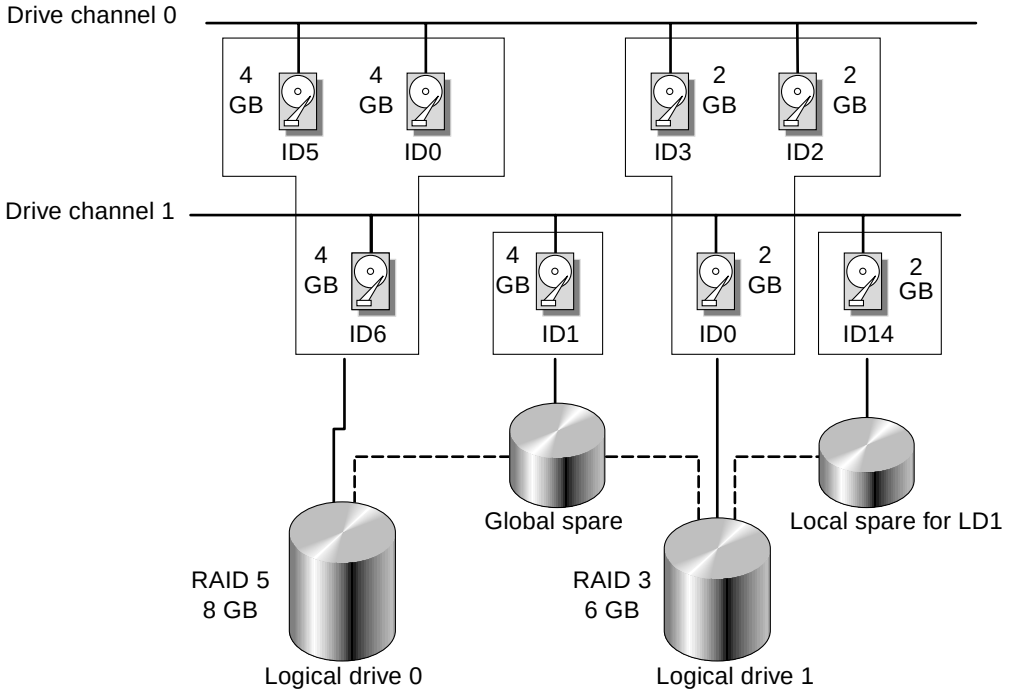


FIGURE A-3 Allocation of Drives in Logical Drive Configurations

You can divide a logical drive or logical volume into several partitions or use the entire logical drive as single partition.

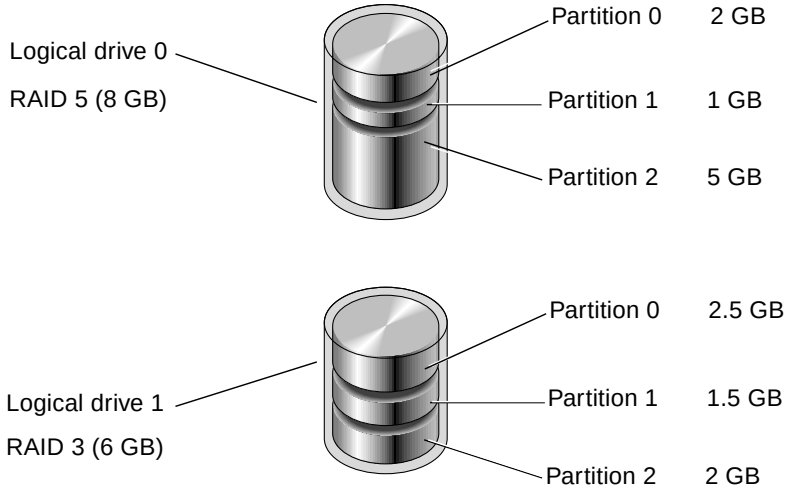


FIGURE A-4 Partitions in Logical Drive Configurations

Each partition is mapped to LUNs under host SCSI IDs or IDs on host channels. Each SCSI ID/LUN acts as one individual hard drive to the host computer.

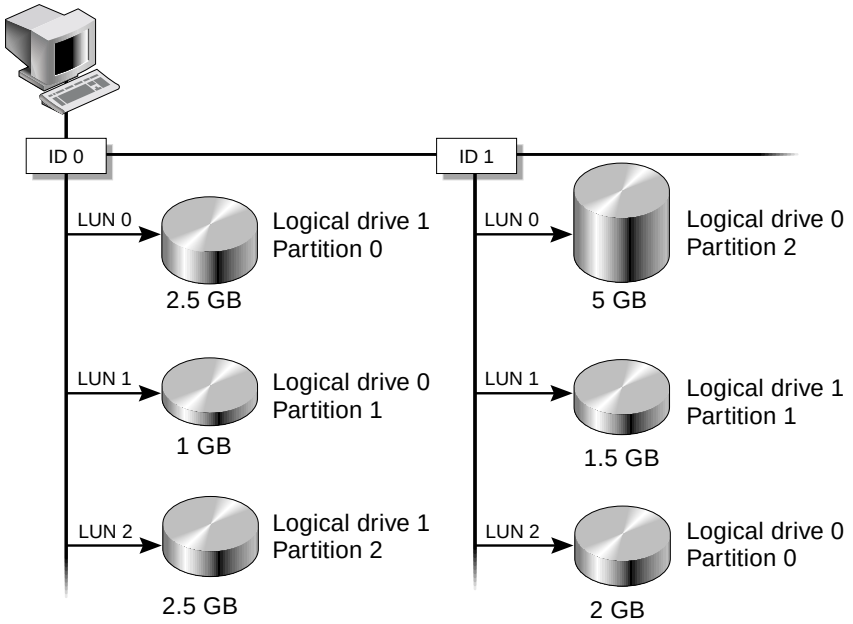


FIGURE A-5 Mapping Partitions to Host ID/LUNs

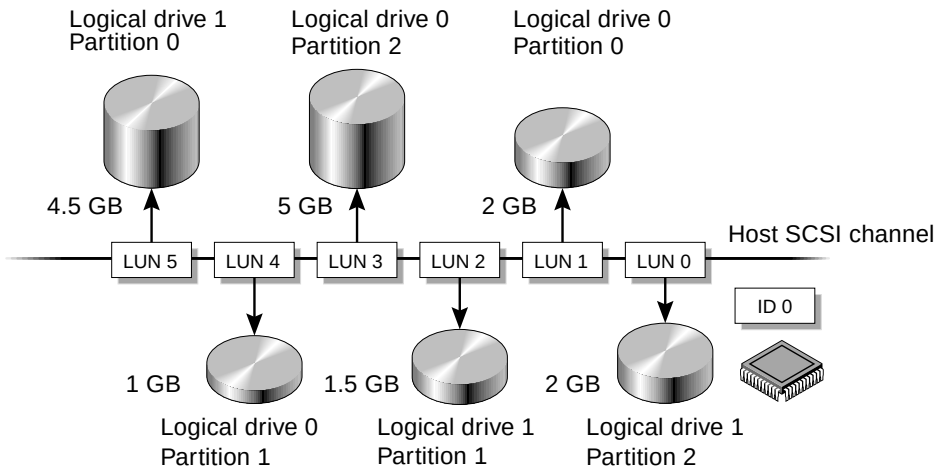


FIGURE A-6 Mapping Partitions to LUNs Under an ID

RAID Levels

There are several ways to implement a RAID array, using a combination of mirroring, striping, duplexing, and parity technologies. These various techniques are referred to as RAID levels. Each level offers a mix of performance, reliability, and cost. Each level uses a distinct algorithm to implement fault tolerance.

There are several RAID level choices: RAID 0, 1, 3, 5, 1+0, 3+0 (30), and 5+0 (50). RAID levels 1, 3, and 5 are the most commonly used.

The following table provides a brief overview of the RAID levels.

TABLE A-1 RAID Level Overview

RAID Level	Description	Number of Drives Supported	Capacity	Redundancy
0	Striping	2–36	N	No
1	Mirroring	2	N / 2	Yes
1+0	Mirroring and striping	4–36 (even number only)	N / 2	Yes
3	Striping with dedicated parity	3–31	N-1	Yes
5	Striping with distributed parity	3–31	N-1	Yes
3+0 (30)	Striping of RAID 3 logical drives	2–8 logical drives	N-# of logical drives	Yes
5+0 (50)	Striping of RAID 5 logical drives	2–8 logical drives	N-# of logical drives	Yes

Capacity refers to the total number (N) of physical drives available for data storage. For example, if the capacity is N-1 and the total number of disk drives in the logical drive is six 36-Mbyte drives, the disk space available for storage is equal to five disk drives—(5 x 36 Mbyte or 180 Mbyte. The -1 refers to the amount of striping across six drives, which provides redundancy of data and is equal to the size of one of the disk drives.

For RAID 3+0 (30) and 5+0 (50), *capacity* refers to the total number of physical drives (N) minus one physical drive (#) for each logical drive in the volume. For example, if the total number of disk drives in the logical drive is twenty 36-Mbyte drives and the total number of logical drives is 2, the disk space available for storage is equal to 18 disk drives—18 x 36 Mbyte (648 Mbyte).

RAID 0

RAID 0 implements *block striping*, where data is broken into logical blocks and is striped across several drives. Unlike other RAID levels, there is no facility for redundancy. In the event of a disk failure, data is lost.

In block striping, the total disk capacity is equivalent to the sum of the capacities of all drives in the array. This combination of drives appears to the system as a single logical drive.

RAID 0 provides the highest performance. It is fast because data can be simultaneously transferred to or from every disk in the array. Furthermore, read / writes to separate drives can be processed concurrently.

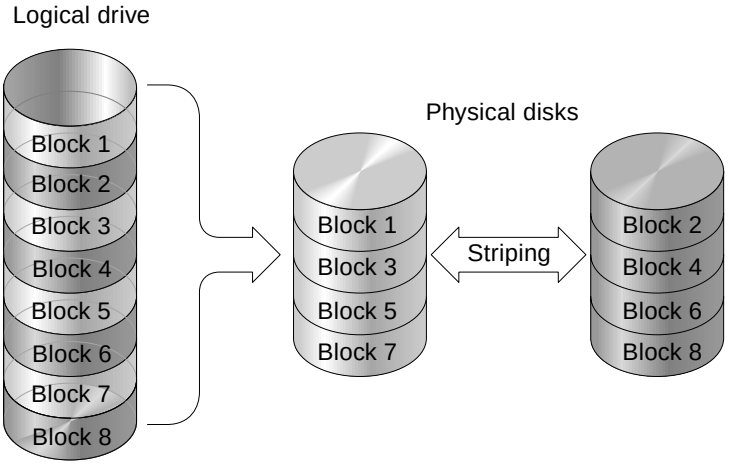


FIGURE A-7 RAID 0 Configuration

RAID 1

RAID 1 implements *disk mirroring*, where a copy of the same data is recorded onto two drives. By keeping two copies of data on separate disks, data is protected against a disk failure. If, at any time, a disk in the RAID 1 array fails, the remaining good disk (copy) can provide all of the data needed, thus preventing downtime.

In disk mirroring, the total usable capacity is equivalent to the capacity of one drive in the RAID 1 array. Thus, combining two 1-Gbyte drives, for example, creates a single logical drive with a total usable capacity of 1 Gbyte. This combination of drives appears to the system as a single logical drive.

Note – RAID 1 does not allow expansion. RAID levels 3 and 5 permit expansion by adding drives to an existing array.

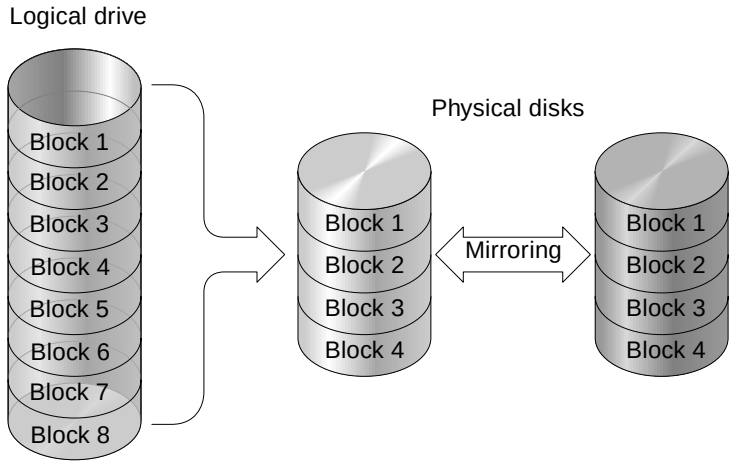


FIGURE A-8 RAID 1 Configuration

In addition to the data protection that RAID 1 provides, this RAID level also improves performance. In cases where multiple concurrent I/O is occurring, that I/O can be distributed between disk copies, thus reducing total effective data access time.

RAID 1+0

RAID 1+0 combines RAID 0 and RAID 1to offer *mirroring and disk striping.* Using RAID 1+0 is a time-saving feature that enables you to configure a large number of disks for mirroring in one step. It is not a standard RAID level option that you can select; it does not appear in the list of RAID level options supported by the controller. If four or more disk drives are chosen for a RAID 1 logical drive, RAID 1+0 is performed automatically.

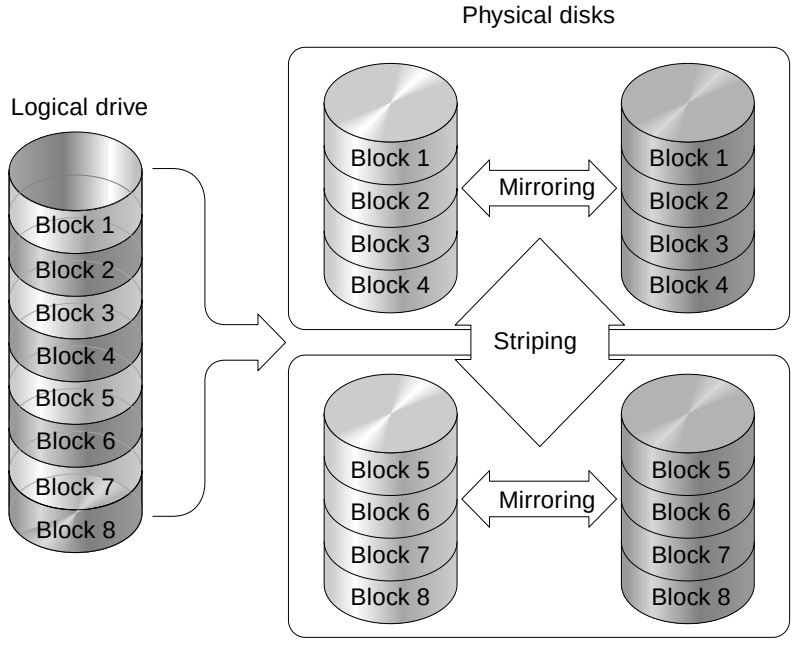


FIGURE A-9 RAID 1+0 Configuration

RAID 3

RAID 3 implements *block striping with dedicated parity.* This RAID level breaks data into logical blocks, the size of a disk block, and then stripes these blocks across several drives. One drive is dedicated to parity. In the event that a disk fails, the original data can be reconstructed using the parity information and the information on the remaining disks.

In RAID 3, the total disk capacity is equivalent to the sum of the capacities of all drives in the combination, excluding the parity drive. Thus, combining four 1-Gbyte drives, for example, creates a single logical drive with a total usable capacity of 3 Gbyte. This combination appears to the system as a single logical drive.

RAID 3 provides increased data transfer rates when data is being read in small chunks or sequentially. However, in write operations that do not span every drive, performance is reduced because the information stored in the parity drive needs to be recalculated and rewritten every time new data is written, limiting simultaneous I/O.

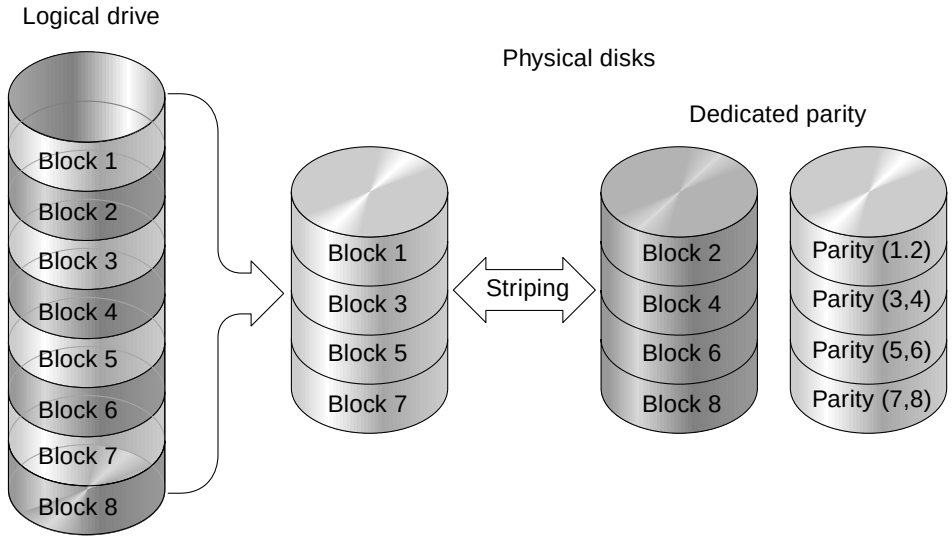


FIGURE A-10 RAID 3 Configuration

RAID 5

RAID 5 implements *multiple-block striping with distributed parity.* This RAID level offers redundancy with the parity information distributed across all disks in the array. Data and its parity are never stored on the same disk. In the event that a disk fails, original data can be reconstructed using the parity information and the information on the remaining disks.

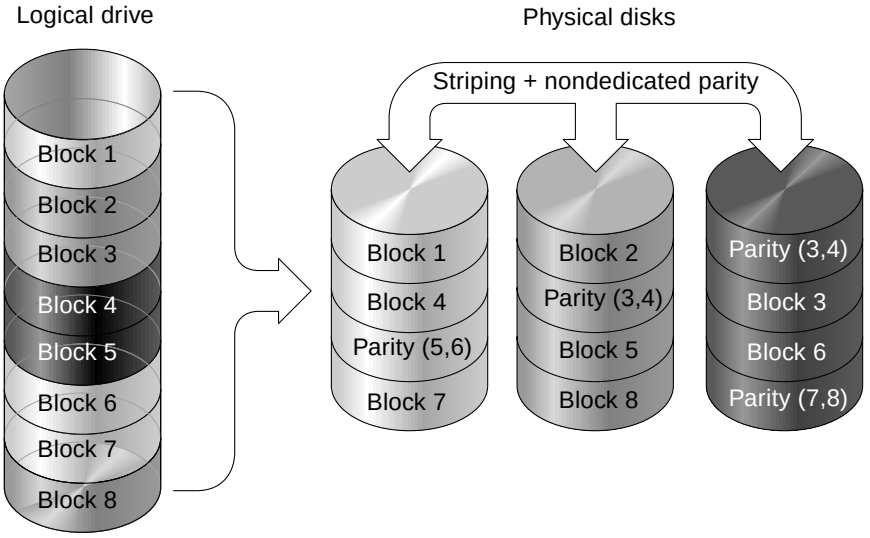


FIGURE A-11 RAID 5 Configuration

RAID 5 offers increased data transfer rates when data is accessed in large chunks, or randomly and reduced data access time during many simultaneous I/O cycles.

Advanced RAID Levels

Advanced RAID levels require the use of the array's built-in volume manager. These combination RAID levels provide the protection benefits of RAID 1, 3, or 5 with the performance of RAID 1. To use advanced RAID, first create two or more RAID 1, 3, or 5 arrays, and then join them. The following table provides a description of the advanced RAID levels.

TABLE A-2 Advanced RAID Levels

RAID Level	Description
RAID 3+0 (30)	RAID 3 logical drives that have been joined together using the array's built-in volume manager.
RAID 5+0 (50)	RAID 5 logical drives that have been joined together using the array's volume manager.

Local and Global Spare Drives

The external RAID controllers provide both local spare drive and global spare drive functions. The local spare drive is used only for one specified drive; the global spare drive can be used for any logical drive on the array.

The local spare drive always has higher priority than the global spare drive. Therefore, if a drive fails and both types of spares are available at the same time or a greater size is needed to replace the failed drive, the local spare is used.

If there is a failed drive in the RAID 5 logical drive, replace the failed drive with a new drive to keep the logical drive working. To identify a failed drive, refer to the *Sun StorEdge 3000 Family RAID Firmware User's Guide* for your array.

Caution – If, when trying to remove a failed drive, you mistakenly remove the wrong drive, you can no longer access the logical drive because you have incorrectly failed another drive.

A local spare drive is a standby drive assigned to serve one specified logical drive. When a member drive of this specified logical drive fails, the local spare drive becomes a member drive and automatically starts to rebuild.

A local spare drive always has higher priority than a global spare drive; that is, if a drive fails and there is a local spare and a global spare drive available, the local spare drive is used.

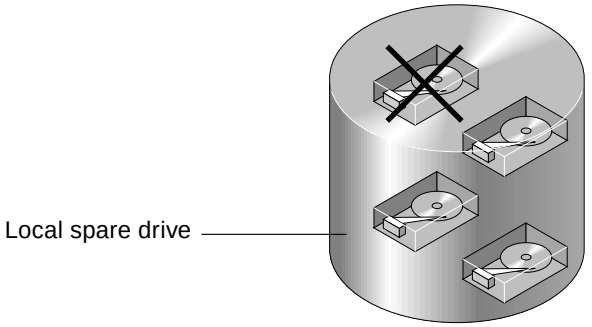


FIGURE A-12 Local (Dedicated) Spare

A global spare drive is available for all logical drives rather than serving only one logical drive (see FIGURE A-13). When a member drive from any of the logical drives fails, the global spare drive joins that logical drive and automatically starts to rebuild.

A local spare drive always has higher priority than a global spare drive; that is, if a drive fails and there is a local spare and a global spare drive available, the local spare drive is used.

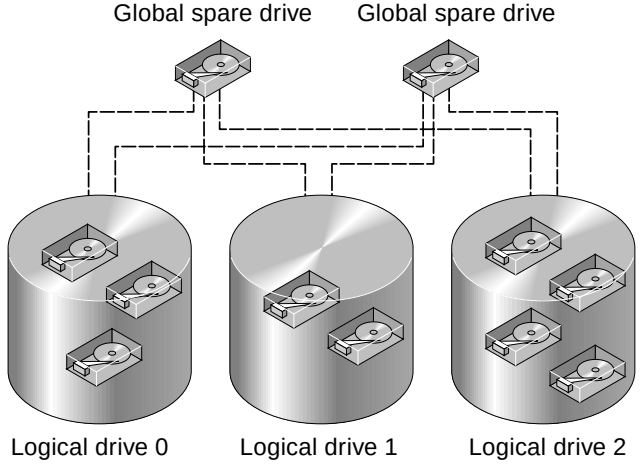


FIGURE A-13 Global Spare

Having Both Local and Global Spares

In FIGURE A-14, the member drives in logical drive 0 are 9-Gbyte drives, and the members in logical drives 1 and 2 are all 4-Gbyte drives.

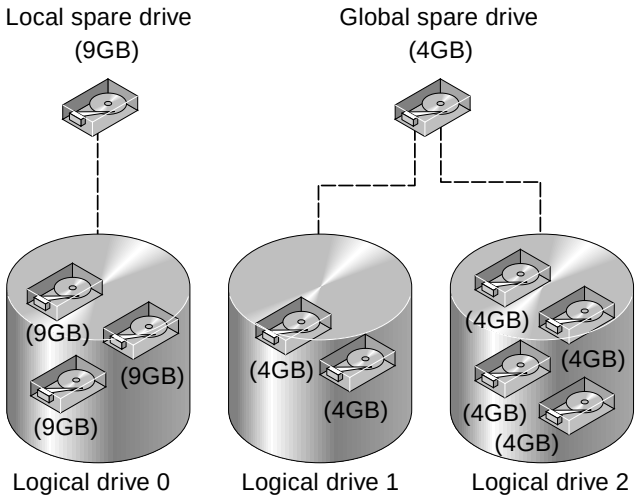


FIGURE A-14 Mixing Local and Global Spares

A local spare drive always has higher priority than a global spare drive; that is, if a drive fails and both a local spare and a global spare drive are available, the local spare drive is used.

In FIGURE A-14, it is not possible for the 4-Gbyte global spare drive to join logical drive 0 because of its insufficient capacity. The 9-Gbyte local spare drive aids logical drive 0 once a drive in this logical drive fails. If the failed drive is in logical drive 1 or 2, the 4-Gbyte global spare drive immediately aids the failed drive.

APPENDIX **B**

Monitoring JBODs (SCSI Only)

This appendix explains how to monitor and download firmware to a standalone JBOD for Sun StorEdge 3310 SCSI arrays only. Note that not all of the array functionality is supported for JBODs. Procedures covered in this appendix include the following:

- "To Enable JBOD Support" on page 211
- "To View Component and Alarm Characteristics" on page 213
- "To Upgrade Firmware on Hard Drives" on page 214
- "To Upgrade Firmware on SAF-TE Devices" on page 215
- "To Replace a Failed Drive" on page 216

▼ To Enable JBOD Support

To monitor peripheral device condition and events of a JBOD, you first need to enable JBOD support.

1. **Select View → Agent Options Management.**

   The Agent Options Management window is displayed.

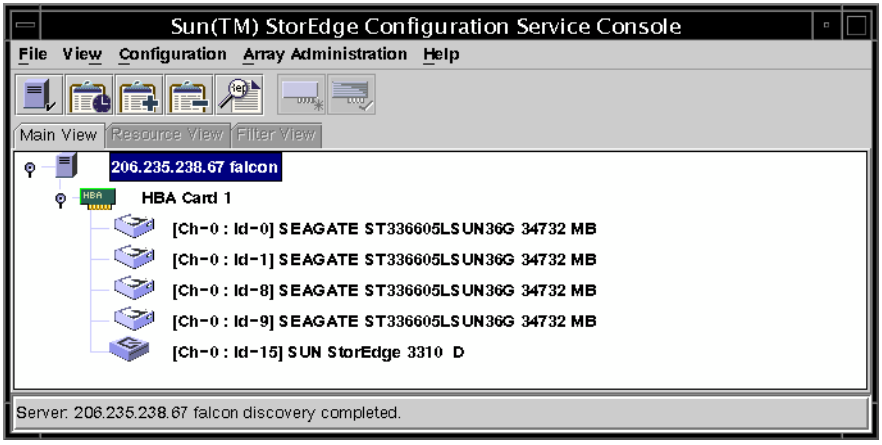
2. **Select the Enable JBOD Support check box.**

3. **To immediately display the JBOD in the main window, you need to probe for new inventory. Select View → View Server and click Probe.**

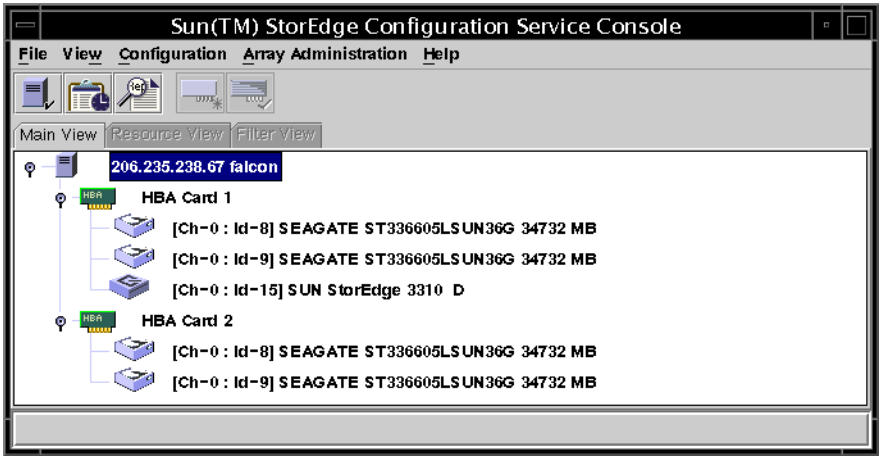
4. **Click OK.**

   The JBOD is displayed in the main window.

   In a single-bus configuration, both ports of the JBOD are connected to one HBA on the server as shown in the following example.


Sun(TM) StorEdge Configuration Service Console
File View Configuration Array Administration Help
Main View Resource View Filter View
206.235.238.67 falcon
HBA Card 1
[Ch-0 : Id-0] SEAGATE ST336605LSUN36G 34732 MB
[Ch-0 : Id-1] SEAGATE ST336605LSUN36G 34732 MB
[Ch-0 : Id-8] SEAGATE ST336605LSUN36G 34732 MB
[Ch-0 : Id-9] SEAGATE ST336605LSUN36G 34732 MB
[Ch-0 : Id-15] SUN StorEdge 3310 D
Server: 206.235.238.67 falcon discovery completed.

In a dual-bus configuration, each port is connected to its own HBA as shown in the following example.


Sun(TM) StorEdge Configuration Service Console
File View Configuration Array Administration Help
Main View Resource View Filter View
206.235.238.67 falcon
HBA Card 1
[Ch-0 : Id-8] SEAGATE ST336605LSUN36G 34732 MB
[Ch-0 : Id-9] SEAGATE ST336605LSUN36G 34732 MB
[Ch-0 : Id-15] SUN StorEdge 3310 D
HBA Card 2
[Ch-0 : Id-8] SEAGATE ST336605LSUN36G 34732 MB
[Ch-0 : Id-9] SEAGATE ST336605LSUN36G 34732 MB

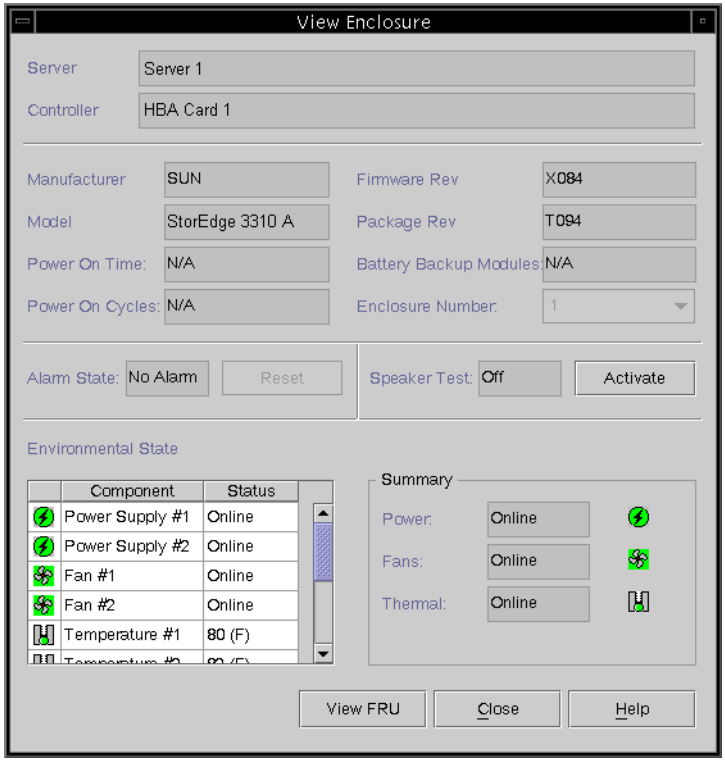
Note – In a dual-bus configuration, if each port is connected to different servers, the program can only monitor the JBOD from the server connected to port B.

▼ To View Component and Alarm Characteristics

The View Enclosure window displays the component and alarm characteristics of a JBOD.

1. **Select the EMU (SCSI) or SES (Fibre Channel) icon .**
2. **Select View → View Enclosure.**

   To display FRU ID information, click View FRU.



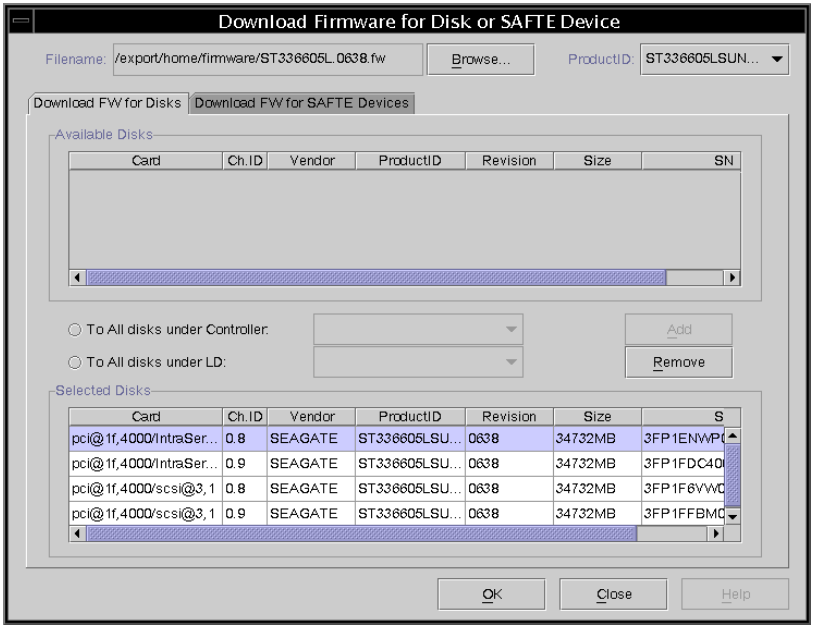
Downloading Firmware for Devices

This option enables you to upgrade the firmware on hard drives and SAF-TE devices on the JBOD.

▼ To Upgrade Firmware on Hard Drives

1. **Select any JBOD component.**
2. **Select Array Administration → Download FW for Devices.**
3. **Click the Download FW for Disks tab.**
4. **Select the drives that you want to download the new firmware to from Available Disks and click Add.**

   If there are logical drives that you want to remove, select them from Selected Disks and click Remove.



5. **Click Browse and locate the download firmware file. Select it, click Open, and click OK.**

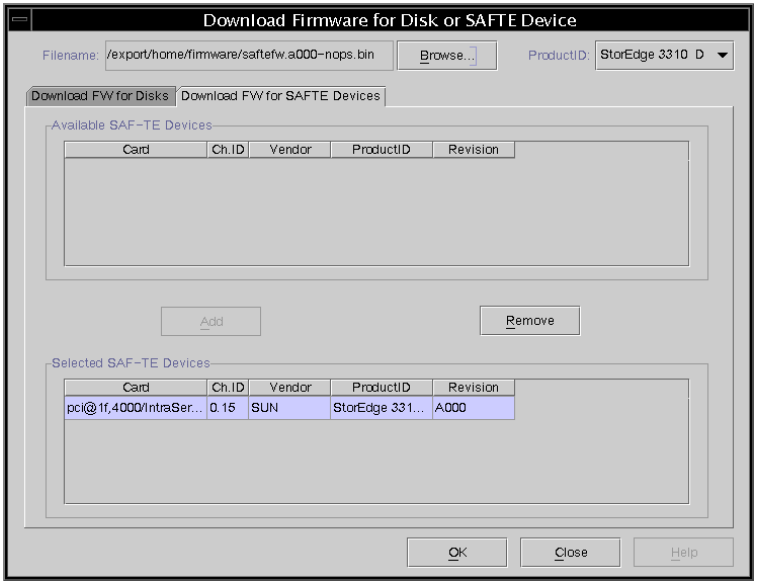
   The firmware starts to download.

6. **When the progress reaches 100%, click OK.**
7. **To update the program, select View → View Server.**
8. **Click Probe and click OK.**
9. **To verify that the firmware has downloaded successfully, select View → View Physical Drive, and make sure the firmware version has changed in the Product Revision field.**

▼ To Upgrade Firmware on SAF-TE Devices

1. **Select any JBOD component.**
2. **Select Array Administration → Download FW for Devices.**
3. **Click the Download FW for SAFTE Devices tab.**
4. **To add a device, select it from Available SAF-TE Devices and click Add.**

   To remove a device, select it from Selected SAF-TE Devices and click Remove.



5. **Click Browse and locate the download firmware file. Select it, click Open, and click OK.**

   The firmware starts to download.

   The array starts beeping and the LEDs start blinking at around 70%.

6. **When the progress reaches 100%, click OK.**
7. **To update the program, select View → View Server, and click Probe.**
8. **Click OK.**
9. **To verify that the firmware has downloaded successfully, select View → View Enclosure, and make sure the firmware version has changed in the Firmware Rev field.**

▼ To Replace a Failed Drive

A drive failure is indicated by a red device status symbol . After replacing a failed drive, perform the following steps.

Solaris Operating Environment

1. **If the drive comes back online automatically (that is, the red device status symbol disappears), run the command**

```
# devfsadm
```

2. **Run the command**

```
# format
```

3. **If the drive does not come back online automatically (that is, the red device status symbol does not disappear), perform a reconfiguration reboot by running the command**

```
# reboot -- -r
```

Windows NT/2000 Operating System

1. **Install the new drive according to the instructions in the *Sun StorEdge 3000 Family Installation, Operation, and Service Manual* for your array.**
2. **Select View → View Server, and click Rescan.**
3. **To verify that the program recognizes the new drive, select it on the main window.**
4. **Select View → View Physical Drive, and verify the information.**

APPENDIX **C**

Using the Cluster Configuration (SCSI Only)

For the Sun StorEdge 3310 SCSI array, if you are using Windows NT, Sun StorEdge Configuration Service can monitor shared SCSI storage. This section covers the following topics:

- "Planning the Cluster Configuration" on page 219
- "Cluster Configuration Requirements" on page 220
  - "To Set Up Cluster Configuration" on page 220
- "To Set Up Cluster Configuration" on page 220

A cluster configuration must be set up with the appropriate hardware first, and it also requires Windows NT Server, Enterprise Edition, with Service Pack 3 or 4, and Microsoft Cluster Server (MSCS) software.

If you are planning to set up a cluster configuration, make sure to read this chapter.

Planning the Cluster Configuration

Before you set up a cluster configuration, you need to determine what type of configuration you want because it can make a difference in how you configure the storage initially.

There are two main types of cluster configuration:

- A hot standby server cluster where all of the LUNs belong to one of the two servers in the cluster. If the server owning the LUNs fails, the LUNs are moved to the second server, which has been idle to this point. A minimum of two LUNs are required in this configuration.

- A load balanced cluster, where some LUNs are maintained on one server and some LUNs are maintained on the other server. Both servers process data at the same time, but they are processing I/O on different LUNs.

A minimum of three LUNs must be defined. This enables one small LUN to be established for quorum disk use and a large LUN to be used on each server in the cluster. The quorum disk maintains the cluster configuration data necessary to recover the cluster in the event of a server failure.

Cluster Configuration Requirements

When you are installing the MSCS software, identify the disk to be used for the quorum disk, which maintains cluster information.

In a cluster configuration, the program runs on only one server at a time, the server that has the quorum disk. If the server running with Sun StorEdge Configuration Service malfunctions, the Cluster Administrator automatically changes the first server's disk load to the second server and start the services on that server.

In a two-server cluster configuration, the cluster itself, with its own IP address, becomes the managed server on the Managed Servers list. Add the cluster to the Managed Servers list as the last step in setting up the cluster.

▼ To Set Up Cluster Configuration

Following is an overview of the steps needed to set up an array in a cluster configuration with two host servers.

1. **Set up the servers.**

   a. **Set up the two servers, each with a PCI bus and a boot disk that is not a part of the shared SCSI storage.**

   b. **Install a host adapter card such as Ultra-Wide, differential host adapter, in each server and set a unique SI ID for each host adapter on the shared SCSI bus.**

   c. **Install two network adapter cards on each server.**

   d. **Install the Windows NT Server, Enterprise Edition, software and Windows NT Service Pack 3 or later on the boot disk of each server.**

2. **Install the dual active–active storage subsystem and connect it to both host adapters.**

   Refer to the supplied documentation for installation steps.

3. **Install the agent on each server.**

   a. **Stop the services on one server before installing it on the other server.**

   b. **Ensure that the service is running on a server that has access to a host LUN mapped on logical drive assigned to primary controller.**

   c. **See the appropriate installation chapter for specific steps for installing the agent.**

      After installing the agent, you do not need to reboot. However, once the agent is installed, be sure to stop the services on one of the servers.

Note – In the next few steps, you will work with one server only as an example.

---

4. **Install the console software.**

   You can install the console on one of the servers or on any computer on the network where the servers reside. The program enables you to configure and monitor the array remotely. See the appropriate installation chapter for detailed steps.

5. **Add the server that has started the services to the console's Managed Servers list (see "To Add Servers" on page 43).**

   Be sure to select Auto Discovery and add the `ssmon` password.

6. **Use the console software to verify and configure the storage on the active server and then reboot that server.**

   Your storage array might already be preconfigured on the dual active–active storage subsystem. You need to look at the configuration in the tree view to determine whether this is the case.

   If the storage is not configured or you want to change the configuration, configure all of the LUNs on one server. Later, after the MSCS software is installed, you can allocate the storage between the servers with Cluster Administrator.

7. **Use NT Disk Administrator to create partitions and format the LUNs on the active server.**

a. **If necessary, reassign drive letters for the disks.**

   Note that partitions must be formatted with NTFS.

   Windows NT sees the LUNs on the dual active–active controllers as being on both servers in the cluster. You can create partitions and logical drives on only one server. Later, after MSCS is installed, you can use the Cluster Administrator to apportion the storage between the two servers.

   The drive letters for the shared SCSI storage for the two servers must be the same. If there is an additional CD-ROM drive or external hard disk on one server and not on the other, you might need to reassign the drive letters for the shared storage. After this step, check them on the other server to make sure they are the same.

b. **Write down the drive letters assigned to the shared storage.**

8. **Access the second server, start Disk Administrator and make sure that the second server has the same drive letters as the first.**

   If it does not, reassign the drive letters so that they are consistent on both servers.

9. **Shut down the second server.**

10. **Install the MSCS software on the first server and reboot.**

11. **Start Cluster Administrator and make sure that it can see the cluster.**

12. **Access the second server, install MSCS on that server by joining it to the first, and reboot.**

13. **Reboot the second server and verify in Cluster Administrator that both servers are included in the cluster.**

14. **Adjust the disk groups in the Cluster Administrator.**

    Make sure that the quorum disk and the other disks, if any, are together in one disk group under the first server where you originally configured the storage. Refer to the MSCS documentation for details to perform this step.

Note – Once you put the two LUNs in the same disk group, you have an empty disk group that you can delete.

---

15. **Add the services to the group that has the quorum disk on the first server.**

    a. **On both servers, stop each of the three services, Configuration Service Startup, Configuration Service Monitor, and Configuration Service Server, and set them to manual.**

b. Use Cluster Administrator to install each service as a resource to the group that has the quorum disk.

For each service, enter it in the following order and type its name in the format indicated (with the two words run together). After each service is installed, bring the service online to start it on the active server.

Enter the services as generic services. You are asked to indicate the dependencies for each resource. The dependencies in the group are as follows:

- Disk associated with the quorum disk
- Other disk, if any to be added to this group
- Configuration ServiceStartup
- Configuration ServiceMonitor
- Configuration ServiceServer

Configuration ServiceStartup is dependent on the two disks that are already in the group. Configuration ServiceMonitor is dependent on Configuration Service Startup, and Configuration ServiceServer is dependent on Configuration Service Monitor.

16. For the two cluster servers to be displayed as one icon under the cluster IP address, edit `CLUSTER.TXT`**.**

The file is located in the same directory as the console files. It is on the system disk of the computer where the console is installed. If Drive C is the system disk, the path is:

```
C:\Program Files\Sun\sscs
```

The following text shows the contents of the file:

```
#Edit this file to map the NT cluster IP address to several
#servers constituting the cluster.
#The format of the entry is:
#<Cluster IP Address>=<server1 IP Address>:<server2 IP Address>
#The IP address must be in dot form.
#Example: If the cluster IP address is 151.239.130.70 and the
#IP addresses of individual servers are 151.239.130.71 and
#151.239.130.72,the entry would be:
# 151.239.130.70=151.239.130.71:151.239.130.72
#
#IMPORTANT NOTE:
#Use only the Cluster IP address to configure an NT cluster
#server on the Configuration Service console.
#
#151.239.130.70=151.239.130.71:151.239.130.72
```

17. Edit the last line of the file to insert the IP address of the cluster and then the IP addresses of the two servers that make up the cluster.

a. Remove the number symbol (#).

18. Start the console and remove the first server from the Managed Servers list, and add the cluster as a server to the list.

19. Access the Server List Setup function. See “To Add Servers” on page 43.

Be sure to select Auto Discovery and add the `ssmon` password. If you type in the cluster name, the program supplies the IP address if your network has DNS.

At this point, the cluster configuration is properly configured to work with the program. If the server that has the services running on it malfunctions, its disk groups are transferred to the second server and the Cluster Administrator automatically starts the services on that server.

Note – When one server fails, it can take as long as 15 minutes for the cluster icon in the console to turn from purple to gray and perhaps another 10 minutes before it goes back to purple again.

If you want to have a load balanced configuration with some of the storage running on the other server, you need to use the Cluster Administrator to move one or more disk groups to the other server.

APPENDIX **D**

Determining Host Worldwide Names (Fibre Channel Only)

This appendix explains how to determine the host worldwide name (WWN), World Wide Node Name (WWNN), and World Wide Port Name (WWPN) of an array. Steps include:

- "To Determine the WWN" on page 225
- "To Determine the WWNN" on page 227
- "To Determine the WWPN" on page 228

▼ To Determine the WWN

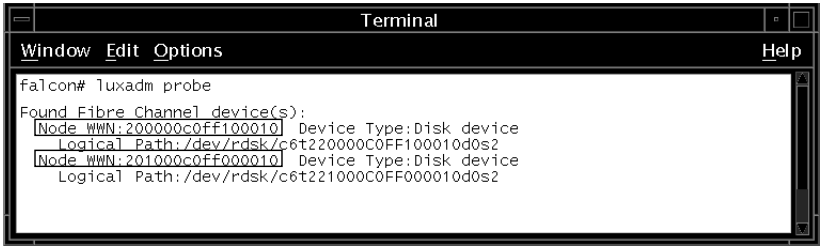
Prior to using the LUN Filter feature, it is helpful to identify which Sun StorEdge 3510 Fibre Channel array is connected to which HBA card, and the WWN assigned to each card.

Solaris Operating Environment

1. **If you have a new HBA device installed on your computer, reboot the computer.**
2. **Type the following the command**

```
# luxadm probe
```

3. **Scroll down the listing to see the Fibre Channel device(s) and the related WWN(s).**



Linux and Windows NT/2000

1. Boot a specific host, and note the bios version and HBA card models connected to your host.
2. Access the HBA card's bios with the appropriate command (alt-q or control-a are commonly used).

   If the host has multiple HBA cards, select the card which is connected to the storage.
3. Scan the card to look for devices attached to it (usually with the Scan Fibre Devices or the Fibre Disk Utility).

   The node name (or similar label) is the worldwide name.

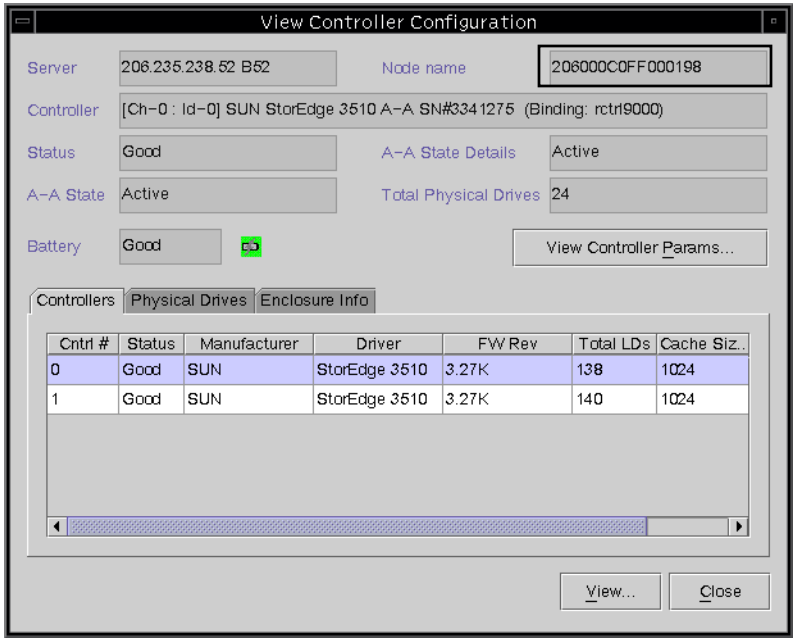
   Example with a Qlogic card:

ID	Vendor	Product	Rev	Node Name	Port ID
0	Qlogic	QLA22xx Adapter	B	210000E08B02DE2F	0000EF

▼ To Determine the WWNN

1. **Double-click the array icon in the main Configuration Service window, or select it and select View → View Controller.**

   The Node name is displayed in the Node name field in the View Controller Configuration window.



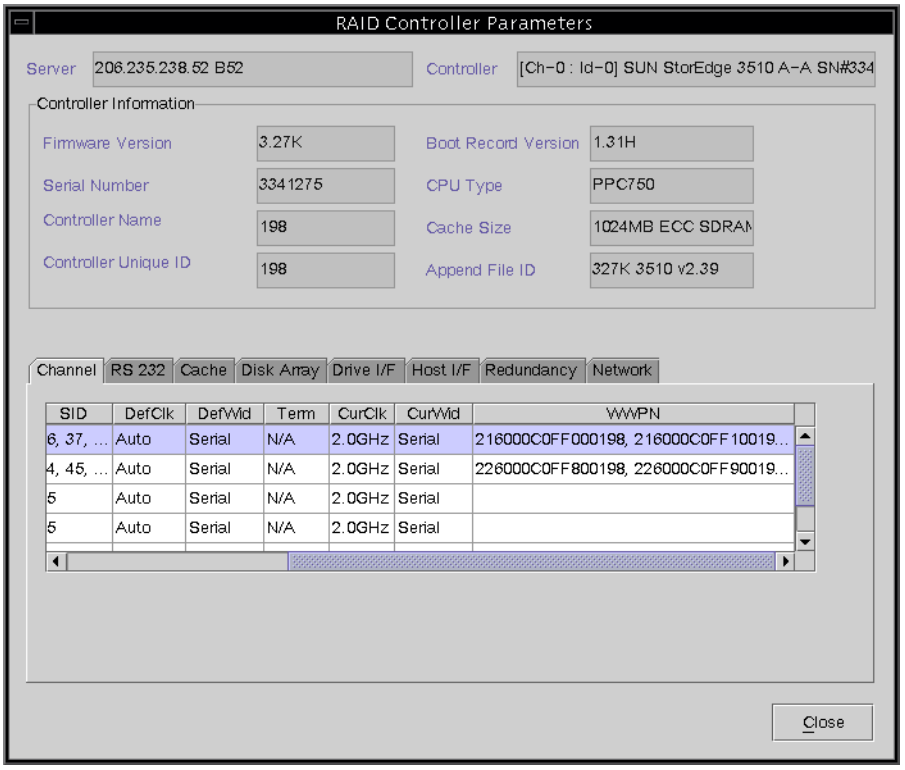
Note – The WWNN information is also included in the xml report generated by the console.

▼ To Determine the WWPN

1. **Double-click the array icon in the main Configuration Service window, or select it and select View → View Controller.**

2. **Click View Controller Parameters.**

   The RAID Controller Parameters window is displayed. On the Channel tab, scroll all the way to the right to display the WWPN.



Note – The WWPN information is also included in the xml report generated by the console.

APPENDIX **E**

Email and SNMP

Sun StorEdge Configuration Service has full event monitoring and email notification capabilities. The consoles can send SMTP email messages to a specified list of email addresses. Some email systems, like Microsoft Exchange, can be configured or programmed with scripts to page administration personnel based on events. Some paging services also support sending these email messages to a pager.

The agents place events in the operating environment's error logs. Agents can also send SNMP traps about mass storage events to an enterprise management console, such as HP OpenView. For a list of monitoring software that uses SNMP, visit the Sun Management Center at `http://wwws.sun.com/software/solaris/sunmanagementcenter/`.

This appendix explains how to set up consoles to send email messages. It also explains how to configure servers to send traps to SNMP management consoles, describes the trap format, and gives background information about SNMP. An additional method for sending SNMP traps that does not require Sun StorEdge Configuration Service is also discussed. Topics covered in this chapter include:

- "Sending Email Messages for Each Server" on page 230
  - "To Send Email Messages for Each Server" on page 230
- "Setting Up Servers to Send Traps" on page 233
  - "To Check the Community String" on page 233
  - "To Specify the Trap Recipient" on page 235
  - "To Set Up Solaris Operating Environment Servers" on page 236
  - "To Set Up Linux Operating Environment Servers" on page 236
- "How SNMP Works" on page 237
  - "To Send SNMP Traps Without Using Sun StorEdge Configuration Service" on page 242

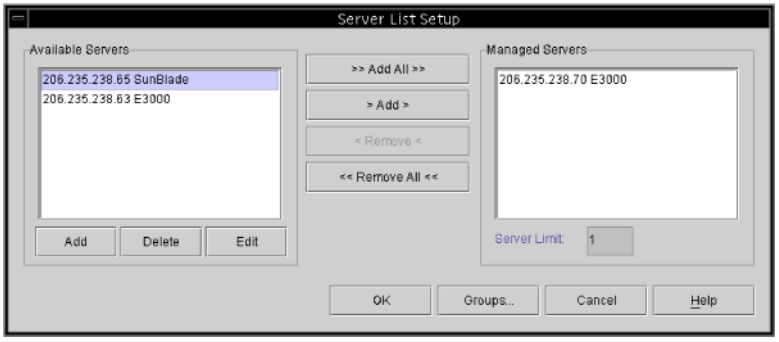
Sending Email Messages for Each Server

Configure the console to send email messages for each managed server through the Server List Setup function.

▼ To Send Email Messages for Each Server

1. **Select File → Server List Setup.**

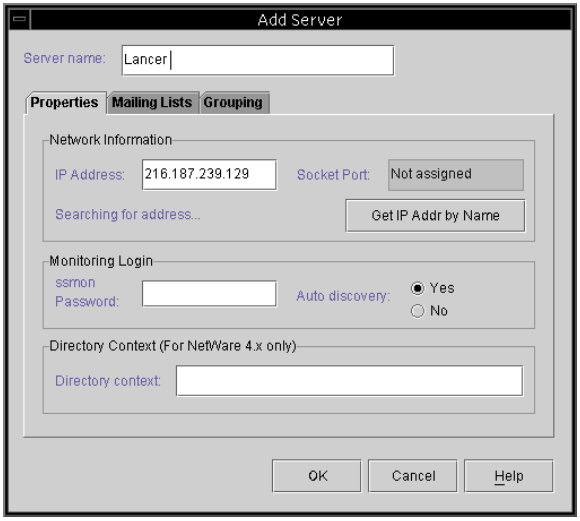
   The Server Setup window is displayed.



2. **Click Add.**

   If the server has already been added, you need to move it to the Available Servers list and click Edit.

   The Add Server window or Edit Server window is displayed. The two windows have the same fields.

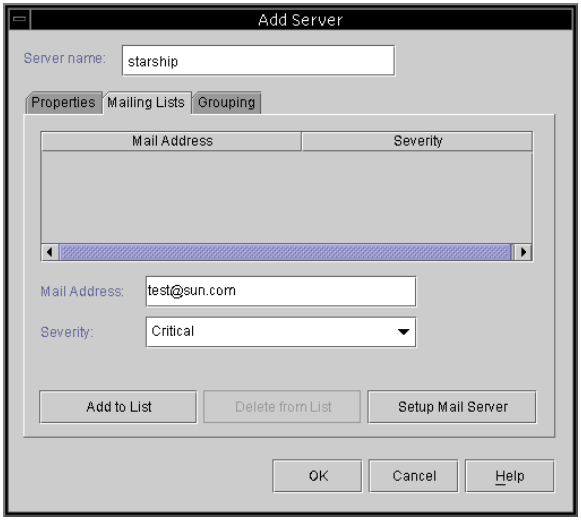


3. **If you have not already added the server, fill in the information about the Properties tab.**

   For detailed information see “Add a server:” on page 44.

4. **To send event messages using email, select the Mailing Lists tab.**

   The Add Server window is displayed with Mailing Lists selected.



   a. **For each user, type an email address in the Mail Address field.**

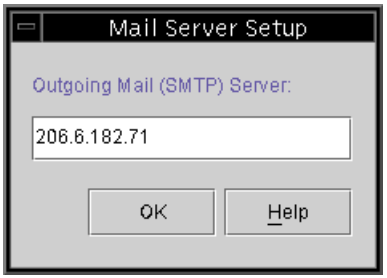
b. In the Severity list box, scroll through the list and select the desired one.

c. Click Add to List.

To delete a user from the list, select the mail address and click Delete from List.

d. Indicate the mail server. Click Setup Mail Server.

The Mail Server Setup window is displayed.



Type the IP address or name of the Simple Mail Transport Protocol (SMTP) mail server that delivers the email messages to the destination addresses specified earlier.

e. Click OK when you are satisfied with the information about the Mail Server window.

The Add Server or Edit Server window is displayed.

5. Click OK when you are satisfied with the information about the Add Server or Edit Server window.

The Server Setup window is displayed.

6. If you want to add additional servers, repeat Steps 2 through 5 for each server.

7. If necessary, move the server or servers you want this console to control to the Managed Servers list.

If you are editing a server, you must move it back to the Available Servers list.

8. Click OK to return to the main window.

Setting Up Servers to Send Traps

If you have an enterprise management console on your network—for example, HP OpenView or IBM NetView, you can configure servers to send traps about events to the console. This section describes the configuration steps needed.

Note – You need to follow the instructions in this section only if you want to send SNMP traps to other enterprise management consoles.

Caution – If HP OpenView is installed on the same server that you are setting up to send traps, to avoid initialization errors, you need to reconfigure the system resources. For instructions on reconfiguring system resources, see the troubleshooting item “Symptom: HP OpenView won’t install or the trap daemon won’t start.” on page 248.

Windows NT Servers

To configure a Windows NT server to send SNMP traps to one or more enterprise management consoles, you need to configure each SNMP service on the server to make sure that:

- The server lists the community string or community name of the enterprise management console.
- The server lists the enterprise management console as the recipient of traps from the Windows NT agents software.

▼ To Check the Community String

You can use the default community name or community string of public. However, choosing a community name other than public provides more security because it limits the communication to only those computers that have the specified community string.

To set the community string for Windows NT 4.0:

1. **In the Control Panel window, double-click the Network icon, and then click the Services tab if it is not already selected.**

   In the Network Services list, scroll to the SNMP service, click once to select it, and then click Properties.

   The Microsoft SNMP Properties window is displayed.

Note – If you do not have the SNMP service installed, you can install it by clicking Add in the Network window. The Select Network Service window is displayed, from which you can select SNMP Service. You need to insert the Windows NT 4.0 CD to enable the computer to copy the necessary files for the SNMP service.

---

2. **Click the Security tab in the Microsoft SNMP Properties window to display the Security settings.**

3. **Make sure that the community name or community string that you want to use for the server is specified in the Accepted Community Names list.**

   If the name is not already on the list, click Add to display the Service Configuration window. Type the new name in the entry field and click Add in that window. The Security tab is displayed with the new name on the Accepted Community Names list.

Note – Community names or community strings are case-sensitive.

---

4. **(*Optional*) If desired, change the default setting of Accept SNMP Packets from Any Host to Only Accept SNMP Packets from These Hosts and add the network address of the enterprise management computer that receives the traps from the agent on the server.**

   Using this setting provides more security because it lets you specify the computer or computers from which the Windows NT agents accept information.

   To add the network address of the computer with Sun StorEdge Configuration Service console software to the lower list box, click Add to access the Security Configuration window. Type the IP address in the Entry box and click Add in that window. The Security tab reappears with the Configuration Service management console computer's address.

5. **Click OK.**

▼ To Specify the Trap Recipient

In this procedure, you are listing the enterprise management console as a recipient of traps from the server.

Note – For the procedure, you need the IP address of the enterprise management console that receives the traps. The procedure also requires the same community name as specified in the preceding sections.

The steps for specifying an enterprise management console computer as the recipient of the agent traps are as follows.

1. **Click the Traps tab of the Microsoft SNMP Properties window to display the Traps settings.**
2. **Make sure the same community name is specified as the community name that was indicated in the Security tab earlier.**

   If you need to correct the community name, type the name in the Community Name field and click Add. If another name is already in the entry field, it is retained after you type over it. To remove a name, select it and click Remove.
3. **Add the IP address of the enterprise management console in the Trap Destinations list.**

   a. **Click Add.**

      The Service Configuration window is displayed.

   b. **Type the IP address in the Entry field and click Add.**

      The Traps tab is displayed with the new network address in the Trap Destinations list.

   c. **Type each IP address in the following format: AAA.BBB.CCC.DDD**

      You do not need to type leading zeros. An example of an appropriate address is:

      192.168.100.1
4. **If you want to send optional traps to another enterprise management console, type the network address of that management workstation.**

   If you have more than one enterprise management console, each one needs to have its address indicated here.
5. **Click OK to confirm your settings.**
6. **Click Close to leave the Network window.**

7. **Exit Windows NT and restart the server.**

   If you are planning to install Sun StorEdge Configuration Service, you do not have to reboot until after you install the software.

▼ To Set Up Solaris Operating Environment Servers

For systems running the Solaris operating environment, you can generate SNMP version 1 traps through an interface to an SNMP trap daemon called `sstrapd`. By default, this daemon does not start automatically during the boot process. The following steps describe how to enable trap processing.

1. **Create the file `/var/opt/SUNWsscs/ssagent/sstrapd.conf` using any standard text editor.**

   This file contains the name or the IP address of the SNMP manager console or consoles. If there is more than one console, list them on separate lines.

2. **Edit the file `/etc/init.d/ssagent` and remove the comment marks from the SNMP-related start section. These lines are marked by an initial double hash mark (##).**

3. **Save the file after these edits.**

   The `sstrapd` daemon starts at the next boot or can be started immediately by running the following command

```
/etc/init.d/ssagent uptrap
```

   This starts the `sstrapd` daemon as well as the other two daemons if they are not currently running. Only one instance of each daemon is running at this point, whether or not any daemons were previously running.

▼ To Set Up Linux Operating Environment Servers

For systems running the Linux operating environment, you can generate SNMP version 1 traps through an interface to an SNMP trap daemon called `sstrapd`. By default, this daemon does not start automatically during the boot process. The following steps describe how to enable trap processing.

1. **Create the file /var/opt/SUNWsscs/ssagent/sstrapd.conf using any standard text editor.**

   This file must be created with a list of either system names or IP addresses (one per line) for the SNMP manager consoles. The file can contain blank lines and comment lines.

2. **Edit the file /etc/init.d/ssagent and remove the comment marks from the SNMP-related start section.**

   These lines are marked by an initial double hash mark (##).

3. **Save the file after these edits.**

   The `sstrapd` daemon starts at the next boot or can be started immediately by running the following command

```
/etc/init.d/ssagent uptrap
```

   This starts the `sstrapd` daemon as well as the other two daemons if they are not currently running. Only one instance of each daemon is running at this point, whether or not any daemons were previously running.

How SNMP Works

Simple Network Management Protocol (SNMP) is one of the most widely used protocols for network management. It does what its name says—it manages network devices in a relatively simple manner. SNMP is a simple, unacknowledged, connectionless protocol.

SNMP was originally developed to work under the umbrella of the Internet suite of protocols, primarily in TCP/IP (Transmission Control Protocol/Internet Protocol) transport protocols. Since then, SNMP has been implemented to work over other common transport protocols, such as Novell's IPX/SPX (Internet Packet Exchange/Sequenced Packet Exchange).

SNMP Trap Messages

Agents use SNMP to send information to enterprise management systems.

Once a server is configured to send traps, event information flows to that system.

Trap messages contain the following information:

- OID (Object Identifier) 1.3.6.1.4.1.2294.1.2
- Event Date (MM, DD,YY, such as 01,22,98)
- Event Time (HH:MM:SS, such as 15:07:23)
- Server Address and Name (IP Address Name, such as 192.187.249.187 Administration)
- Card Name
- Event Severity (Informational, Warning, Critical)
- The text message

The information that is displayed and its format are dependent on the SNMP management console you are using.

The file `RST_OID.MIB` must be loaded into the enterprise management console for traps to be received. On Solaris or Linux OEs, this file is located in `/opt/SUNWsscs/ssagent`. On Microsoft Windows, this file is located in `\Program Files\Sun\ssagent`.

Agents and Managers

The SNMP software model consists of agents and managers. An agent is the software that enables variables in the managed device to be monitored. The agent software is either embedded in the device that is managed or running on a computer to which the device is connected.

The manager or management console is the network monitoring software that uses SNMP to send requests to the agents about the variables. The manager polls the agents periodically because the values of variables change. SNMP managers typically analyze the data received from the agents and make it available to the user in a graphical display. The data can be stored in a database for historical and trend analysis.

In addition to responding to the SNMP manager's requests, agents can send unsolicited notifications or traps to the management station. This is similar to interrupts in conventional software.

Management consoles can take various actions in response to a trap. Usually, traps are logged, and the information in them is forwarded through a notification scheme to the interested user. Traps can also cause the SNMP manager to initiate further action, such as querying the agent with more requests to find out the current status of the network entity or launching an application.

Management Information Base (MIB)

On a network, each device instrumented by SNMP agents has one or more variables or objects associated with it. An example of a typical variable might be one that keeps track of the name of the device. These variables or objects are described in a text file called `Management Information Base` (`MIB`). A MIB is a precise textual definition of variables being managed. The procedures for defining a MIB have been established by the Internet Engineering Task Force (IETF) of the International Standards Organization (ISO).

SNMP Objects

Some variables for network management are common to all LAN network devices. Many of these variables have been standardized and are referred to as MIB-II variables and MIB-II extensions. The IETF has also defined the procedures for MIBs that are not in a standard MIB-II category. These variables are listed in private enterprise MIBs.

Variables are listed under the entry of the private enterprise MIB. For example, the object ID 1.3.6.1.4.1.2294.1.2 refers to an object ID (or OID) of a variable for keeping track of the agent version under one of Configuration Service's MIBs.

The chart in FIGURE E-1 shows how the OID was derived. The check marks indicate the nodes in the OID. In a MIB, the data of a specific variable or object resides below its OID.

Sun's tree node is 2294. Every private enterprise wanting to develop agents to recognize its own devices can apply to the IETF for its own tree node.

SNMP Request Types

The SNMP operations that support accessing MIB data are `Get`, `GetNext`, and `Set`. Get retrieves a scalar value from a table entry field value, given an index value. GetNext is used to traverse the instances of table entries, with each command returning the next sequential value in the column (or field) of interest. The Set operation is used to create or change the value of a MIB variable.

SNMP Security

Setting values raises the issue of security. SNMP V1 (version 1) has a simple security scheme. Each protocol data unit (PDU) contains a community string, which is like a combination of user name and password. Each agent can be configured for a particular community string. An agent does not respond to a request sent to it except when the community string in the request PDU matches the community string in its own configuration.

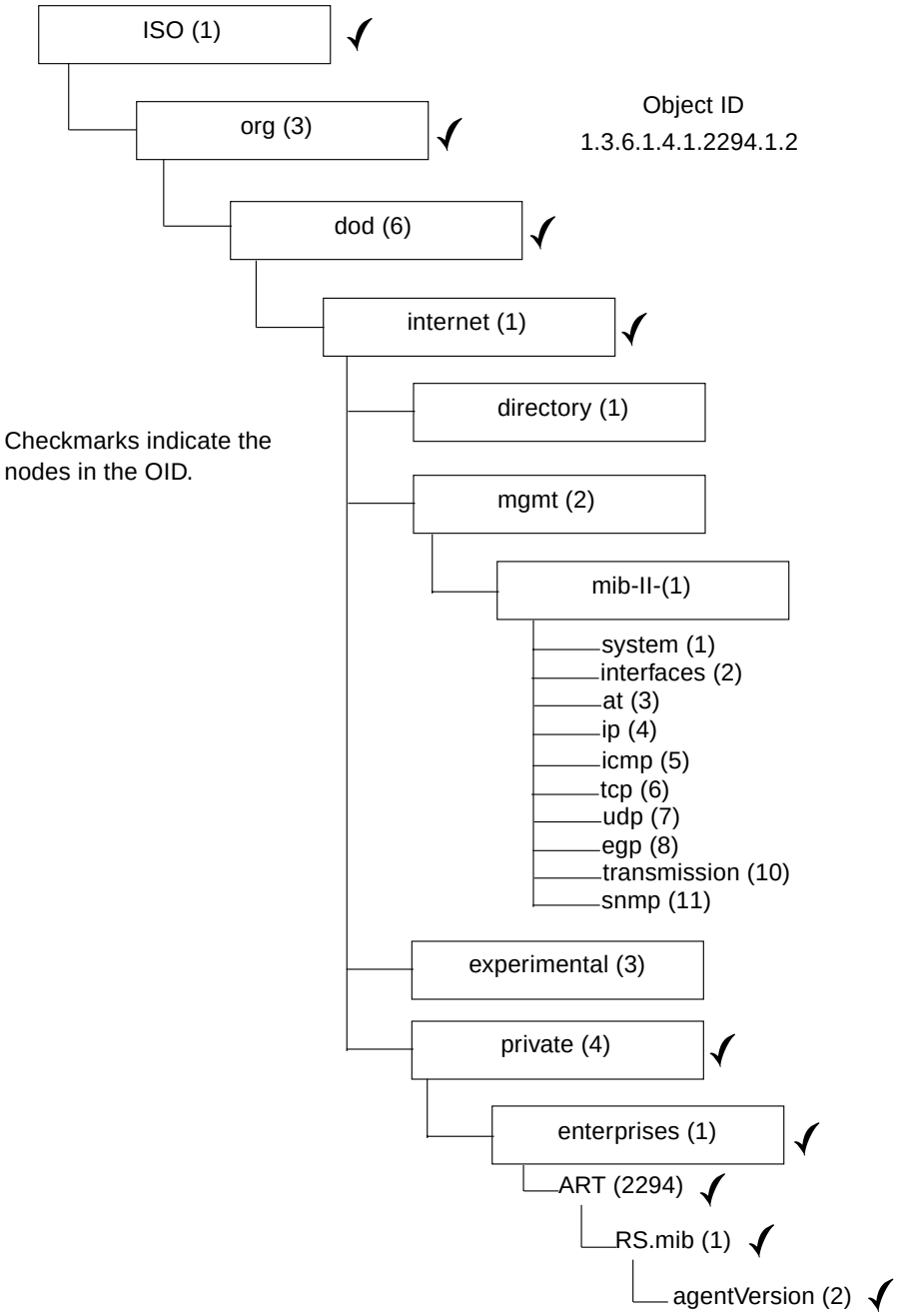


FIGURE E-1 Object Identifier of a MIB Variable

▼ To Send SNMP Traps Without Using Sun StorEdge Configuration Service

The following is an alternative method for sending SNMP traps that does not require Sun StorEdge Configuration Service.

The array can send SNMP traps about mass storage events to an enterprise management console, such as HP OpenView. The following configuration does not require that the agent be installed in order to send SNMP traps.

1. **Open a text editor.**
2. **Type the following information, replacing the variables as they apply to your network:**

```
[SNMP_TRAP]
ENABLED=1
RECEIVER1=123.123.123.123
```

```
[EMAIL]
ENABLED=1
SUBJECT=RAID Event
SENDER_MAIL_BOX=someone@somecompany.com
SMTP_SERVER=123.123.123.123
RECEIVER1=somebody@somecompany.com
```

3. **Save the file using the following name** `agent.ini`**.**
4. **FTP from your workstation to the array.**
5. **Type the user name of root and press Return**
6. **When prompted for a password, press Return.**

   If you have previously specified a password for the controller, you need to type that password when prompted.

7. **Once logged in, change to the** `/cfg` **directory.**
8. **Put the file from your workstation into the** `/cfg` **directory.**
9. **Quit the FTP session.**
10. **Reset the controllers through which ever method you are using to manage the array, for example, console, Telnet, or terminal session.**

APPENDIX **F**

Troubleshooting

This chapter provides troubleshooting suggestions for the following symptoms:

- "Symptom: When Installing Sun StorEdge Configuration Service, java -version returns a pre 1.2.2 Java runtime environment software version, but the machine has Java runtime environment 1.2.2, 1.3, or 1.4 software installed." on page 244
- "Symptom: A server is not responding or a server may be down." on page 244
- "Symptom: No logical drives are listed when trying to add a logical volume from existing logical drives." on page 245
- "Symptom: An IP address of a server in a DHCP environment has changed." on page 246
- "Symptom: Traps are not received from a server." on page 246
- "Symptom: HP OpenView won't install or the trap daemon won't start." on page 248
- "Symptom: The console does not show changes when hardware is added or replaced." on page 248
- "Symptom: LG is not present on systems running the Solaris operating environment." on page 249
- "Symptom: Environmental alarms are not being reported." on page 249
- "Symptom: The console appears to run slowly." on page 249
- "Symptom: Sun StorEdge Diagnostic Reporter stops working." on page 250
- "Symptom: (Solaris or Linux) The online help is not displayed." on page 250

Symptom: When Installing Sun StorEdge Configuration Service, java -version returns a pre 1.2.2 Java runtime environment software version, but the machine has Java runtime environment 1.2.2, 1.3, or 1.4 software installed.

- Check the `/usr` directory to confirm there is a link from Java to the latest version of Java instead of Java 1.1.

  To check the Java runtime environment software version, type

```
# cd /usr
ls | grep java
```

  (*Solaris OE*) If the link is not to the latest version listed, type

```
rm java
ln -s /usr/xxx /usr/java
```

  where *xxx* is the latest version of the Java runtime environment software.

Symptom: A server is not responding or a server may be down.

Make sure the services are running at the server.

1. ***(Solaris OE)* Run the following command**

```
# ps -e | grep ss
```

The names `ssmon` and `ssserver` should both be present in the output. If they are not, proceed to Step 2. If they are, proceed to Step 4.

(*Windows NT*) Go to Settings → Control Panel → Services and verify that SUNWscsd Monitor, SUNWscsd Server, and SUNWscsd Startup services are started. If they are not, proceed to Step 2. If they are, proceed to Step 4.

(*Windows 2000*) Go to Start → Administrative Services → Computer Management. Click Services & Applications and verify that SUNWscsd Monitor, SUNWscsd Server, and SUNWscsd Startup services are started. If they are not, proceed to Step 2. If they are, proceed to Step 4.

2. **(*Solaris or Linux OEs*) Stop and start the daemons as explained in "To Start or Stop the Agent" on page 13.**

   (*Windows NT/*2000) Stop and start the services by right-clicking the service you want to start or stop.

3. **If the daemons/services do not stop/start properly, do a reconfiguration reboot.**

4. **Make sure that the TCP/IP protocol software is loaded, and that the network card and the network connection are working.**

   To test the TCP/IP connectivity at the command-line, type

   ```
   # ping {IP address of the server or the server name}
   ```

   If you do not get a reply, there is a problem in the TCP/IP protocol services. Contact your MIS department for assistance.

5. **Make sure that the correct server name and password are specified.**

   If the name or password is not correct, make the correction by editing the entries. For Solaris OEs, see "Administrative (User) Security Levels and Guidelines" on page 14. For Windows NT/2000, see "Administrator (User) Security Levels and Guidelines" on page 23. For Linux OEs, see "Administrative (User) Security Levels and Guidelines" on page 32.

   The password has to be the one established through the procedure for setting up users.

   - Make sure the users (`ssmon`, `ssadmin`, `ssconfig`) were set up properly. Be sure that Users are set up in Windows NT with Permissions Act as a part of the operating system and Log on as a batch job.
   - If you are using a naming service (Windows NT domains, and NIS or NIS+ in a Solaris OE), make sure that the users have been correctly added to the naming service.
   - If you have entered the user names in a domain under Windows NT, allow some time for the user names to propagate.

Symptom: No logical drives are listed when trying to add a logical volume from existing logical drives.

If you do not see any logical drives listed under Select a Logical Drive, the logical drives have not been unmapped and therefore are unavailable to select. You must unmap the logical drives first.

Symptom: An IP address of a server in a DHCP environment has changed.

In a DHCP environment, there is a remote possibility of a server's IP address changing if the server has been offline for longer than three days.

In these cases, the console must be notified of the new IP address of the server because the console communicates with the server through its IP address.

To remedy this situation, the server's new IP address needs to be entered into the Edit Server window of the console software.

1. **Select File → Server List Setup.**
2. **Move the server name from the Managed Servers list to the Available Servers list.**

   The Edit Server window is displayed. This window shows the server name and the IP address as it was configured.
3. **Select the name of the server in the Available Servers list, and click Edit.**

   The Edit Server window is displayed. This window shows the server name and the IP address as it was configured.
4. **If the network address has changed, click Get IP Addr by Name.**

   The program searches for and displays the correct IP address if you provided the name of the server as it is recorded by the service used by your network. Otherwise, you must type the IP address.

   If the name used for the server is not the same as the server's network name, or if the naming service is not yet updated, you have to type the IP address manually.
5. **Once the server IP address is entered, click OK to specify the changed address and go back to the Server List Setup window.**
6. **Move the server name back to the Managed Servers list.**
7. **Click OK to leave the Server List Setup window.**

Symptom: Traps are not received from a server.

To troubleshoot why a trap from a server is not received on an SNMP management workstation, such as HP OpenView, use the following steps:

1. **Make sure that the SNMP service has been started on the server.**

   Verify that `sstrapd` is running by running the following command

```
# ps -e | grep ss
```

The output includes the name `sstrapd`; if it does not, see “To Start or Stop the Agent” on page 13 for instructions on enabling a daemon.

Under Windows NT, go to Control Panel → Services and check whether the SNMP service is listed and is shown as started. If it is not, install it, and then start the service. Refer to your Windows NT documentation for details.

2. **Check that the proper target address of the enterprise management console and the community string is set up on the server properly.**

   The detailed steps for the proper setup on a Windows NT server for sending traps to an enterprise management console are given in “Setting Up Servers to Send Traps” on page 233.

3. **Make sure that the MIB is compiled under the SNMP management console.**

   On Solaris or Linux OEs, the `RST_OID.MIB` file is located in `/opt/SUNWsscs/ssagent`. On Microsoft Windows, this file is located in `\Program Files\Sun\ssagent`. Refer to your SNMP management console documentation (such as HP OpenView) for information about how to compile the MIB.

4. **Under Windows NT, check the NT registry entries for Sun StorEdge Configuration Service.**

   If the entries are absent, reinstall the agent on the server.

   a. **First, make sure that**

      `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\SNMP\Parameters\ExtensionAgents`

      contains an entry for `SSAGENT`.

   b. **Second, check that**

      `HKEY_LOCAL_MACHINE\SOFTWARE\Sun\Sun StorEdge Configuration Service Agent\SNMP Extension Agent\Current Version`

      points to the extended agent program with the complete path name:

      `C:\PROGRA~1\Sun\ssagent\SSAGENT.DLL`

      `C:\PROGRA~1\Sun\ssagent\`

      is the default installation directory.

      If you have installed the program in another directory, make sure to point it to that directory.

c. **Third, make sure that**

   `SSAGENT.DLL`

   is in the `C:\PROGRA~1\Sun\ssagent` directory.

Symptom: HP OpenView won't install or the trap daemon won't start.

If you installed HP OpenView on the same server that you set up to send SNMP traps, there are insufficient system resources for both the trap daemon and HP OpenView to run. Reconfigure system resources as explained in the following steps.

1. **Add the following lines to the end of `/etc/system`.**

```
set shmsys:shminfo_shmmax=x2000000
set shmsys:shminfo_shmmin=1
set shmsys:shminfo_shmmni=256
set shmsys:shminfo_shmseg=256

set semsys:seminfo_semmap=256
set semsys:seminfo_semmni-=512
set semsys:seminfo_semmns=512
set semsys:seminfo_semms1=32
```

2. **Reboot the server.**

Symptom: The console does not show changes when hardware is added or replaced.

If you add new equipment or if you replace a failed device, such as a disk drive, tape drive, power supply, or fan, the console does not always show updated information. At times, the tree view and the other views associated with it do not reflect the actual status of a device.

If a new device is added and you want this device to be recognized before the next periodic scan, click Rescan in the Server View window. The server immediately rescans for the inventory, and the console updates its server inventory and present the result of any changes in the tree view. To ensure a timely inventory, do a manual scan.

You might have to click Rescan more than once. When the server is in the process of a rescan and the console sends a request for the inventory, the server sends the console the server inventory at its last update, because it has not yet finished the current scan.

Symptom: LG is not present on systems running the Solaris operating environment.

If the LG is not being displayed, be sure the LG is labeled and not excluded by Sun StorEdge Configuration Service (if installed).

Symptom: Environmental alarms are not being reported.

Storage enclosures with SCSI-based enclosure monitoring capabilities (such as SAF-TE cards) send environmental alarms to the console. The alarm state can be caused by a failure of a drive, fan, power supply, or battery, or by an abnormal temperature.

If an environmental alarm occurs, you must click Reset in the View Enclosure window to clear the alarm. You need to have configuration security privileges to click Reset in the software.

The SAF-TE monitoring specification for these storage enclosures requires that after an alarm occurs, subsequent environmental alarms are not generated until the alarm has been reset.

After the alarm is reset, environmental events are again displayed in the Event Log.

Symptom: The console appears to run slowly.

The console under Windows NT requires at least 10 Mbyte of free virtual memory (physical memory plus the page file size) on the console workstation. The console program is more responsive with larger available physical memory, which minimizes the operating system *paging* of memory from physical memory to the page file.

When the amount of memory used approaches the total available virtual memory (physical memory plus the page file size), the excessive paging likely causes problems, resulting in poor performance of all applications on that workstation.

Increase the physical memory and page file size to increase the overall virtual memory. To change the page file size, select Control Panel → System, and then choose the Performance tab in the System Properties window that is displayed. In Windows NT, change the page file size under the Virtual Memory section of the Performance tab window.

Symptom: Sun StorEdge Diagnostic Reporter stops working.

If you stop receiving email messages from Sun StorEdge Diagnostic Reporter, it might no longer be working and might need to be stopped and restarted.

(Solaris OE) There are three conditions under which Sun StorEdge Diagnostic Reporter stops working and does not report its condition. The workaround is to stop and restart it.

- If the agent fails or is stopped and restarted, Sun StorEdge Diagnostic Reporter stops working.
- If the Config Tool is running and the daemon is stopped and restarted, a condition might occur whereby the Config Tool can no longer communicate with the daemon.
- If the agent fails or is stopped, the daemon does not detect it, stops sending email messages, and continues to show that Sun StorEdge Diagnostic Reporter is still connected by displaying a green status.

Stop and restart Sun StorEdge Diagnostic Reporter by typing

```
# /etc/init.d/ssdgrptd stop
# /etc/init.d ssdgrptd start
```

Symptom: (Solaris or Linux) The online help is not displayed.

Make sure the absolute pathname of the web browser you want to use to display online help has been specified.

1. **Go to** `/opt/SUNWsscs/sscsconsole` **and type**

```
./config_sscon
```

2. **Enter the absolute pathname of the web browser.**

APPENDIX **G**

Error Codes and Messages

This appendix provides a list of error codes and error and status messages.

Error Codes

Shown and described in the Event Log, an error code is an eight-character code that consists of four fields of two characters each. Some codes might be followed by a dash and another eight-character code, which is for internal use only.

The following tables describe the error codes used in each two-character field. The format of the four fields of two characters is:

SSMMmmEE

where

SS = the Severity Field

MM = the Major Field

mm = the Minor Field

EE = the Error Field

TABLE G-1 Severity Field

Severity Field	Description
01	Critical
02	Warning
03	Informational

TABLE G-2 Major Field

Major Field	Description
01	Not Used
03	Legacy
04	RAIDCard Card message
05	JBOD (Just a bunch of disks) message
06	SSMon monitor message
07	dll/shared library message
08	SSserver message
09	HBA (Host Bus Adapter) message
0A	Server Communications message
0B	Controller message

The Minor field is defined in following table. The definition of the Error Field is dependent upon the definition of the Minor Field in which case the appropriate Table is referenced.

TABLE G-3 Minor Field

Minor Field	Description
01	Unknown
02	See “Error Field: System Drive State” on page 254.
03	See “Error Field: Disk State” on page 254.
04	See “Error Field: SAF-TE State” on page 255.
05	See “Error Field: Tape State” on page 255.
06	See “Error Field: Redundancy State” on page 256.
07	See “Error Field: Internal State” on page 257.
08	See “Error Field: Device State” on page 257.
09	See “Error Field: Initialization State” on page 258.
0A	See “Error Field: Invalid Client Parameter” on page 258.
0B	See “Error Field: Open Transport” on page 259.
0C	See “Error Field: Close Transport” on page 259.
0D	See “Error Field: Memory Allocation” on page 259.
0E	RaidCard fault detected.
0F	See “Error Field: Transport” on page 259.
10	See “Error Field: Command” on page 260.
11	See “Error Field: Command” on page 260.
12	See “Error Field: Main Communications” on page 260.
13	See “Error Field: Communications Async” on page 261.
14	See “Error Field: Communications Security” on page 261.
15	See “Error Field: Timeout” on page 261.
16	See “Error Field: Administration” on page 261.
17	See “Error Field: Firmware” on page 262.
18	See “Error Field: System Shutdown” on page 262.
19	Dynamic Growth fault detected.
1C	See “Error Field: Set Config” on page 263.
1D	See “Error Field: Controller Event” on page 263.

TABLE G-3 Minor Field *(Continued)*

Minor Field	Description
1E	See “Error Field: Drive Side Event” on page 264.
1F	See “Eror Field: Host Side Event” on page 265.
20	See “Error Field: Logical Drive Event” on page 265.
23	See “Server Manage / Monitor Event Error” on page 266.

Error Field: System Drive State

TABLE G-4 System Drive State Errors

Error Field	
01	Offline
02	Degraded
03	Online
04	Unknown
05	Parity Check
06	Reconstruction
07	Reconfiguration
08	Dynamic Growth
09	Nonexistent
0A	Initialization

Error Field: Disk State

TABLE G-5 Disk State Errors *(1 of 2)*

Error Field	Description
01	Offline
02	Degraded
03	Online

TABLE G-5 Disk State Errors *(2 of 2)*

Error Field	Description
04	Unknown
05	SMART
06	Dead

Error Field: SAF-TE State

TABLE G-6 SAF-TE State Errors

Error Field	Description
01	Power
02	Fan
03	Thermal
04	Alarm
05	Locked
06	Slot
07	Unknown
08	Unable to get SAF-TE information
09	Battery
0A	Invalid Number of Slots
0B	Environmental Data Not Available

Error Field: Tape State

TABLE G-7 Tape State Errors

Error Field	Description
01	Read
02	Write
03	Hard Error
04	Media Error
05	Read Failure

TABLE G-7 Tape State Errors *(Continued)*

Error Field	Description
06	Write Failure
07	Media Life
08	Not Upgradable
09	Write Protect
0A	Nonremoval
0B	Cleaning Media
0C	Unsupported Format
0D	Snapped Tape
14	Clean Now
15	Clean Periodic
16	Expired Cleaning Media
1E	Hardware A
1F	Hardware B
20	Interface
21	Eject Media
22	Down Load Fail
28	Loader Hardware A
29	Loader Tray Tape
2A	Loader Hardware B
2B	Loader Door
C8	Query Log Failed
C9	Inquire Tape Failed

Error Field: Redundancy State

TABLE G-8 Redundancy State Errors

Error Field	Description
01	Mode OK
02	No Memory for Negotiation
03	Secondary Failure

TABLE G-8 Redundancy State Errors *(Continued)*

Error Field	Description
04	Secondary Removed
05	Detected Removal of Secondary
06	Detected Insertion of Secondary
07	Primary Failure
08	Primary Removed
09	Detected Removal of Primary
0A	Detected Insertion of Primary
0B	Unknown State
0C	Partner Failed
0D	Partner Inserted
0E	Partner Removed

Error Field: Internal State

TABLE G-9 Internal State Errors

Error Field	Description
01	No Memory
02	Semaphore
03	Thread
04	No Devices

Error Field: Device State

TABLE G-10 Device State Errors

Error Field	Description
01	Inquiry
02	Unknown

Error Field: Initialization State

TABLE G-11 Initialization State Errors

Error Field	Description
01	dll Initializing
02	dll Initializing Failed

Error Field: Invalid Client Parameter

TABLE G-12 Client Parameter Errors

Error Field	Description
01	Set Configuration – Configuration Miscompare
02	Set Configuration – Configuration Device Invalid
03	Set Configuration – Enquire Miscompare
04	Set Configuration – Enquire2 Miscompare
05	Incorrect Application Length
06	Command not Supported
07	Invalid Command
08	Set Configuration – General Miscompare
09	Invalid Length
0A	Invalid Card Identifier
0B	Invalid Card Name
0C	Invalid Parameter
0D	Invalid Command for Card Type
0E	Set Configuration – Invalid Additional Parameter
0F	Set Configuration – Block Overlap
10	Set Configuration – Device Information Invalid

Error Field: Open Transport

TABLE G-13 Open Transport Errors

Error Field	Description
01	Open Transport

Error Field: Close Transport

TABLE G-14 Close Transport Errors

Error Field	Description
01	Close Transport

Error Field: Memory Allocation

TABLE G-15 Memory Allocation Errors

Error Field	Description
01	Insufficient Memory
02	Insufficient Memory for Administration Operation

Error Field: Transport

TABLE G-16 Transport Field Errors

Error Field	Description
01	Lock Fault
02	Insufficient Memory
03	Acquire Lock Fault
04	Release Lock Fault
05	Invalid Command
06	Invalid Length

TABLE G-16 Transport Field Errors *(Continued)*

Error Field	Description
07	Invalid Card Name
08	Invalid Card Identification
09	No Cards Found
0A	No Devices Found
0B	Open Fault
0C	Card Name not Found

Error Field: Command

TABLE G-17 Command Code Errors

Error Field	Description
01	Lock Fault

Error Field: Main Communications

TABLE G-18 Main Communications Errors

Error Field	Description
01	Socket Fault
02	Report Fault
03	Thread Fault
04	Lock Fault
05	System Fault

Error Field: Communications Link

TABLE G-19 Communications Link

Error Field	Description
01	Socket Fault

Error Field: Communications Async

TABLE G-20 Communications Async

Error Field	Description
01	Socket Fault
02	Thread Fault
03	Cold Link Fault
04	Send Event Fault

Error Field: Communications Security

TABLE G-21 Communications Security

Error Field	Description
01	Security Violation

Error Field: Timeout

TABLE G-22 Timeout Errors

Error Field	Description
01	Configuration Update
02	Lock Timeout

Error Field: Administration

TABLE G-23 Administration Errors

Error Field	Description
01	Set Customer Name Fault
02	Set Configuration Ended
03	Initialize

TABLE G-23 Administration Errors *(Continued)*

Error Field	Description
04	Initialize Ended
05	Rebuild
06	Rebuild Ended
07	Parity Check
08	Parity Check Ended
09	Set SAF-TE Slot State
0A	Set SAF-TE Perform Slot
0B	Set SAF-TE Send Global
0E	Schedule Parity Check
0F	Schedule Parity Check Ended
10	Set Controller Parameters
11	Firmware Download
12	Consistency Check or Rebuild Ended

Error Field: Firmware

TABLE G-24 Firmware Download Errors

Error Field	Description
01	Not a SAF-TE Device
02	Invalid Data Length
03	Download Failed
04	Check Sum Failed

Error Field: System Shutdown

TABLE G-25 System Shutdown Errors

Error Field	Description
01	System Shutdown Failed

Error Field: RDP Path Change

TABLE G-26 RDP Path Change Errors

Error Field	Description
01	RDP Path Failed
02	RDP Path Restored

Error Field: Set Config

TABLE G-27 Set Config Errors

Error Field	Description
01	Set Configuration Thread creation Failed
02	Get Logical Drive List Command Failed
03	Create Config Command Failed
04	Init Completion Status Command Failed
05	Get Configuration Command Failed
06	Change Volume Config Command Failed
07	Delete Logical Drive Command Failed

Error Field: Controller Event

TABLE G-28 Controller Event Errors

Error Field	Description
01	Controller Reset
02	Controller DRAM Parity Error
03	Redundant Controller Failed
04	Controller Power Supply Failed
05	Controller Fan Failed
06	Controller Temperature Alert

TABLE G-28 Controller Event Errors *(Continued)*

Error Field	Description
07	Controller UPS AC Power Loss
08	Controller Initialization Complete
09	Controller Power Supply Back Online
0A	Controller Fan Back Online
0B	Controller Temperature Normal
0C	Controller UPS AC Power Back On

Error Field: Drive Side Event

TABLE G-29 Drive Side Event Errors

Error Field	Description
01	Drive Channel Select Timeout
02	Drive Channel SCSI Bus Error
03	Drive Channel Unexpected Disconnect
04	Drive Channel Negotiation Error
05	Drive Channel Target Timed Out
06	Drive Channel Parity Error
07	Drive Channel Data Under Or Overrun
08	Drive Channel Undefined Error
09	Drive Channel SCSI Bus Reset Issued
0A	Drive Channel Not Ready Error
0B	Drive Channel Target HW Error
0C	Drive Channel Target Media Error
0D	Drive Channel Unexpected Unit Attention
0E	Drive Channel Unexpected Sense Data
0F	Drive Channel Block Reassign Fail
10	Drive Channel Block Reassign Success
11	Drive Channel SCSI Aborted Command

TABLE G-29 Drive Side Event Errors *(Continued)*

Error Field	Description
12	Drive Channel SCSI Channel Fail
13	Drive Channel Smart Fail
14	Drive Channel Scan SCSI Drive

Eror Field: Host Side Event

TABLE G-30 Host Side Event Errors

Error Field	Description
01	Host Channel SCSI Bus Reset
02	Host Channel SCSI Bus Device Reset
03	Host Channel Abort Tag Message
04	Host Channel Parity Error
05	Host Channel Reselect Timeout

Error Field: Logical Drive Event

TABLE G-31 Logical Drive Event Errors

Error Field	Description
01	Logical Drive SCSI Drive Fail
02	Logical Drive Initialization Fail
03	Logical Drive Rebuild Fail
04	Logical Drive Initialization Commenced
05	Logical Drive Initialization Completed
06	Logical Drive Rebuild Commenced
07	Logical Drive Rebuild Completed

TABLE G-32 Server Manage / Monitor Event Error

Error Field	Description
01	Server to Manage / Monitor has changed.

Error and Status Messages

Most error and status messages are self-explanatory. TABLE G-33 clarifies terms which are used in messages. TABLE G-34 lists the Error / Status messages.

TABLE G-33 Substituted Values

Value	Description
Channel	Card channel number indicating a SCSI channel. A value of 1 indicates the first channel.
Fan	Fan number.
Enclosure	Enclosure number.
LogicalArray	Logical array number.
LogicalDrive	Logical Drive number.
Lun	LUN number.
Name	A text name.
Power	Power supply number.
Slot	Slot number.
State	State of a logical array or a device or an enclosure in text. The values are: Critical, Online, Offline, Critical Rebuild, Non Existent, Low Battery, Normal.
Target	A target or SCSI ID number.
Temperature	The temperature in centigrade.

TABLE G-34 Error / Status Messages

Error and Status Messages
A SCSI Drive Failed (Ch:%d,Id:%d). Replace the defective drive.
A tape has been left in the autoloader by a previous hardware fault. Insert an empty magazine to clear the fault. If the fault does not clear, turn the autoloader off and then on again. If the problem persists, call the tape drive supplier helpline.
A user named ssconfig must be created for configuring SUNWsscs Diag Reporter.
Abort Clone SCSI Drive.
Abort Initialization.
Abort Parity Check.
Abort Rebuild.
Abort / Clear-Queue / Abort-Tag Message received (SCSI Channel %d, SCSI ID %d, Target Lun %d). Possible failure of I / O module, cable, controller, or HBA.
Access denied for one or more servers. Log in as ssconfig user, and then try the operation again.
Access denied for one or more servers. Please log in as an ssadmin user and then try the operation again.
Active trap events is empty.
Add Physical drive %d:%d has started on logical drive *LogicalDrive*.
Add Physical drive has completed on logical drive *LogicalDrive*.
Add SCSI Drive into Logical Drive information.
Agent Name is empty.
An error occurred while getting data from the server.
An HBA card with this WWN already exists.
Another instance of this program is already running!
Array Admin in Progress.
At least one email address needs to be configured.
Attempted to load a cartridge type, not supported by this drive. The cartridge has been automatically ejected. Attempted to load an unsupported tape format.
Attempted to write to a write-protected cartridge. Remove the write-protection or use another tape.
Audible alarm has an unknown status
Audible alarm has been triggered.

TABLE G-34 Error / Status Messages *(Continued)*

Error and Status Messages
Audible alarm has been turned off.
Background check or rebuild operation in progress.
Background initialization in progress.
Background parity check in progress.
Background rebuild operation in progress.
Bad Block Encountered (Ch:%d,Id:%d). Sector number is %u. Informational message.
Block Reassignment Failure (Ch:%d,Id:%d). Defective drive. Replace.
Block Reassignment Succeeded (Ch:%d,Id:%d.) Informational message. Drive may be failing.
Cannot accept the incoming connection.
Cannot allocate memory.
Cannot bind TCP port with the opened TCP / IP communication.
Cannot connect with the incoming connection.
Cannot create a communication session for the incoming connection.
Cannot create host LUN filter; no host IDs were selected.
Cannot create standard host LUN mapping, no host IDs were selected.
Cannot find the logical drive that was just created. It may have been aborted.
Cannot get configuration from controller. The operation is canceled.
Cannot get configuration in set configuration.
Cannot listen on the opened TCP / IP communication.
Cannot lock a resource.
Cannot open TCP / IP communication.
Cannot perform IOCTL on the TCP / IP communication.
Cannot query incoming data status of the connection.
Cannot receive data from the connected client.
Cannot report status.
Cannot send data to the connected client.
Change logical drive failure.
Change logical volume failure.
Change or set local / global standby drives successful.

TABLE G-34 Error / Status Messages *(Continued)*

Error and Status Messages
Changes made to Optimization will NOT take effect until all the logical drives are deleted and then the controller is RESET.
Click View to select one file.
Close transport fail at set configuration.
Collect mail canceled by user.
Communication is reestablished with controller.
Configuration information saved successfully!
Connect and Login command error
Contact Fax number format is wrong.
Contact Name is empty
Contact Phone number format is wrong.
Continue add drv on logical drive *LogicalDrive*.
Controller Event, Battery %s %s. Informational message.
Controller Event, Battery %s %s. Likely battery module error. If error persists, replace defective battery module.
Controller Event, Controller Init Complete. Controller has been rebooted. Informational message.
Controller Event, Controller Reset. Informational Message.
Controller Event, DRAM Parity Error. Likely controller error. If error persists, replace defective controller.
Controller Event, Fan Back On-line. Informational message.
Controller Event, Fan Failure Detected. Fan is integrated with power supply. Replace power supply. Check LED indicators to identify supply.
Controller Event, Power Supply Back On-line. Informational message.
Controller Event, Power Supply Failure Detected. Replace power supply. Check LED indicators to identify supply.
Controller Event, Redundant Controller Failure Detected. Likely controller error. If error persists, replace defective controller.
Controller Event, SDRAM Error. Likely controller error. If error persists, replace defective controller.
Controller Event, Temperature Alert. Check room temperature, clogged or restricted airflow. Correct as necessary.
Controller Event, Temperature Back to Normal. Informational message.
Controller Event, UPS AC Power Back On. Informational message.

TABLE G-34 Error / Status Messages *(Continued)*

Error and Status Messages
Controller Event, UPS AC Power Loss Detected. Contact technical support.
Controller has been reset.
Controllers back in redundancy mode!
Controllers back in redundancy mode!
Copy & Replace has completed on Physical drive %d:%d.
Copy & Replace has started from Physical drive %d:%d to %d:%d.
Copy & Replace on Physical drive %d:%d has been aborted.
Create logical drive failure.
Create logical volume failure.
Creating Host LUN filter Entry; please wait…
Creating standard Host LUN mapping; please wait…
Customer Fax number format is wrong.
Customer Name is empty.
Customer Phone number format is wrong.
Data is at risk. Media performance of this tape is severely degraded. Copy any data you require from this tape. Do not use this tape again. Restart the operation with a different tape.
Data Under / Overrun(Ch:%d,Id:%d). Likely poorly seated or defective drive. If random drives, possible I / O module or cable failure on drive loop.
Decrypt mail canceled by user.
Delete logical drive failure.
Delete logical volume failure.
Deleted disk successfully!
Deleting disk; please wait…
Deleting Host LUN filter Entry; please wait…
Deleting standard Host LUN mapping; please wait…
Device at [Channel:Target] has failed the self-reliability test.
Device information failed.
Disk is labeled successfully.
Door lock has an unknown status.
Door locked.

TABLE G-34 Error / Status Messages *(Continued)*

Error and Status Messages
Door unlocked.
Download Firmware with Boot Record.
Downloading Firmware to the devices
Downloading Firmware to the RAID Controller.
Drive SCSI Ch:%d; Id:%d Likely poorly seated or defective drive. If random drives, possible I / O module or cable failure.
Email address format is wrong.
Enclosure #Enclosure state change: Name
Enclosure *#Enclosure*, temperature threshold has changed from a *State* state to a *State* state.
Engaging firmware; a controller reset is not necessary.
Error in writing file, please try later!
Error occurred. Reset the config file.
Expand LD / LV information.
Expand logical volume successfully.
Expansion has completed on logical drive *LogicalDrive*.
Expansion has started on logical drive *LogicalDrive*.
Expansion logical drive *LogicalDrive* has been aborted.
Fan *#Fan* has an unknown status.
Fan *#Fan* is malfunctioning.
Fan *#Fan* is not present in the system.
Fan *#Fan* is operational.
File I / O error. Configuration could not be restored!
Firmware downloaded to SAF-TE / SES device (Ch:%d,Id:%d) failed.
Firmware downloaded to SAF-TE / SES device (Ch:%d,Id:%d) successfully.
Firmware downloaded to SCSI drive (Ch:%d,Id:%d) failed.
Firmware downloaded to SCSI drive (Ch:%d,Id:%d) successfully.
First select one Logical Drive!
First select one physical device.
First select one RAID controller.
For RAID1 Logical Drive 'Add Drive' / 'Copy and Replace' function is disabled.
Forward mail canceled by user.

TABLE G-34 Error / Status Messages *(Continued)*

Error and Status Messages
Generic File Mutex lock is not released.
Get logical drive list failure.
Getting Agent Options failed!
Getting Controller Parameters failed!
Getting Host LUN Assignments failed! Please try again
Getting the configuration failed!
Gross Phase / Signal Error Detected (Ch:%d). Check drive seating, cables, and I / O module. Replace as required. Redundant controllers failed to bind.
Group Name can not be empty
Host LUN filter Entry created successfully!
Host LUN filter Entry deleted successfully!
Host LUNs modified successfully.
If file access is not properly coordinated when assigned to multiple hosts, data corruption and access contentions may occur.
If Minimum interval is \“0\” or \“*\”, then Content must be \“Event\”
If the firmware download progress is interrupted the controllers / devices may become unusable.
Initialization has completed on logical drive *LogicalDrive*.
Initialization has started on logical drive *LogicalDrive*.
Initialization on logical drive *LogicalDrive* has been aborted.
Initialization operations have completed.
Initialization, rebuild, expand, or add SCSI drive activities are in progress. Try again later.
Inserted failed primary controller.
Inserted failed secondary controller.
Invalid data received.
Invalid server IP address!
IP Address format error (must be xxx.xxx.xxx.xxx and 0 < xxx <255) !
IP Address is duplicated!
IP Address is empty.
Location is empty.
Log in as \“ssconfig”\ user and try the operation again.

TABLE G-34 Error / Status Messages *(Continued)*

Error and Status Messages
Logical array *LogicalArray* has changed from a *state* state to a *state* state.
Logical Drive *%d*, a SCSI Drive Failed. Replace defective drive.
Logical Drive ID *%d* exceeds 2 TB size limitation for sequential optimized LD.
Logical Drive ID *%d* exceeds 512 GB size limitation for random optimized LD.
Logical Drive ID *%d*, Rebuild Aborted. Informational message.
Logical Drive ID *%d*, Rebuild Completed. Informational message. Replace defective drive with new drive.
Logical Drive ID *LogicalDrive* rebuild has aborted.
Logical Drive ID *LogicalDrive* rebuild has completed.
Logical Drive ID *LogicalDrive* rebuild has started.
Logical Drive ID *LogicalDrive*, Add drive paused. Informational message.
Logical Drive ID *LogicalDrive*, Add SCSI Drv Aborted. Informational message.
Logical Drive ID *LogicalDrive*, Add SCSI Drv Completed. Informational message.
Logical Drive ID *LogicalDrive*, Add SCSI Drv Failed. Non-recoverable error. Likely drive failure or a non-recoverable error on stripe. Run parity check on the logical drive. Contact technical support.
Logical Drive ID *LogicalDrive*, Clone Aborted. Informational message.
Logical Drive ID *LogicalDrive*, Clone Completed. Informational message.
Logical Drive ID *LogicalDrive*, Clone Failed. Non-recoverable error. Likely drive failure or a non-recoverable error on stripe. Run parity check on the logical drive. Contact technical support.
Logical Drive ID *LogicalDrive*, Expand Aborted. Informational message.
Logical Drive ID *LogicalDrive*, Expand Completed. Informational message.
Logical Drive ID *LogicalDrive*, Expand Failed. Non-recoverable error. Likely drive failure or a non-recoverable error on stripe. Run parity check on the logical drive. Contact technical support.
Logical Drive ID *LogicalDrive*, Initialization Aborted. Informational message.
Logical Drive ID *LogicalDrive*, Initialization Completed. Informational message.
Logical Drive ID *LogicalDrive*, Initialization Failed. Informational message. Possible defective drive or slot. User may have aborted operation.
Logical Drive ID *LogicalDrive*, Parity check aborted by user. Parity check should be run to completion in order to verify data integrity of the specified Logical Drive.
Logical Drive ID *LogicalDrive*, Parity Check Completed. Informational message.

TABLE G-34 Error / Status Messages *(Continued)*

Error and Status Messages
Logical Drive ID *LogicalDrive*, Rebuild Failed. Informational message. Possible defective drive or slot. User may have aborted operation.
Logical Drive ID *LogicalDrive*, Starting Add SCSI Drive Operation. Informational message.
Logical Drive ID *LogicalDrive*, Starting Clone. Informational message.
Logical Drive ID *LogicalDrive*, Starting Expansion. Informational message.
Logical Drive ID *LogicalDrive*, Starting Initialization. Informational message.
Logical Drive ID *LogicalDrive*, Starting Parity Check. Informational message.
Logical Drive ID *LogicalDrive*, Starting Parity Check. Informational message.
Logical Drive ID *LogicalDrive*, Starting Rebuild. Informational message.
Logical Drive *LogicalDrive* has changed from a *State* state to a *State* state.
Logical Drive *LogicalDrive* has changed from a *State* state to a *State* state.
Logical Drive *LogicalDrive*, Parity Check Failed. Non-recoverable error. Likely drive failure or a non-recoverable error on stripe. Run parity check on the logical drive. Contact technical support. *Note: If you manually aborted Parity Check, there is no risk of data corruption. There is no need to contact technical support.*
Logical Volume Components List. Total disks in this Logical Volume=
Login successful
Login unsuccessful
Logout command error.
Mail information is empty
Memory Allocation Error. Unable to load daemon.
Minimum interval between emails must be one of the following formats: \“*\” \“0\” “\nn\” \“nn:mm\”
Minimum interval can’t meet Content value.
Minimum interval format error.
Minimum interval format is HH[:MM].
Minimum interval is empty.
Monitor Stopped.
Multiple IP assignment mechanisms are not supported. Select only one mechanism.
Mute beeper.
Mute controller beeper failure.

TABLE G-34 Error / Status Messages *(Continued)*

Error and Status Messages
Mute controller beeper.
Mutex Lock is not released.
Mutex Lock timeouts.
Mutex Lock(s) cannot be created!
Mutex Lock(s) change state failed!
Negotiation Error (Ch:%d,Id:%d). Check drive seating, cables, and I/O module. Replace as required.
New parity check schedule has been created.
No admin progress exists.
No Admin progress was found. All activity should be complete!
No array administration activity in progress!
No more events to report.
No new controller was found; you do not need to reboot the system.
No rebuildable drive available.
Not Ready Error Reported by Target (Ch:%d,Id:%d). Likely poorly seated or defective drive. Possible defective drive slot.
Only the last partition of a LD / LV can be deleted.
Open transport fail at set configuration.
Open transport, Lock fail, the original lock holder's IP address is %s.
Open transport, LogIn fail.
Operation completed successfully.
Operation failed.
Operation in progress.
Operation on one of the servers failed.
Out of the scope!
Parity Check Aborted.
Parity check confirmation.
Parity check could not be started on logical drive *LogicalDrive*.
Parity check has completed on logical drive *LogicalDrive*.
Parity check has started on logical drive *LogicalDrive*.
Parity check on logical drive *LogicalDrive* has been aborted.

TABLE G-34 Error / Status Messages *(Continued)*

Error and Status Messages
Parity check schedule has been removed.
Parity check schedule has been updated.
Parity Error (Ch:%d,Id:%d). Likely poorly seated or defective drive. If random drives, possible I/O module or cable failure.
Parity Error (SCSI Channel %d, SCSI ID %d, Target Lun %d). Possible failure of I/O module, cable, controller, or HBA.
Partition 0 cannot be deleted.
Partition table is full. New partitions cannot be added.
Password error!
Password is empty.
Port is invalid (port must be between 0 and 65535).
Port is invalid (port must be between 1270 and 1273).
Power supply *#Power* has an unknown status.
Power supply *#Power* is malfunctioning and has been switched off.
Power supply *#Power* is malfunctioning or disabled.
Power supply *#Power* is not present in the system.
Power supply *#Power* is operational but disabled.
Power supply *#Power* is operational.
Power supply *#Power* is present in the system.
Primary controller failed!
Probe Agent command error!
Progress Not Available.
RAID Controller firmware checksum failed - corrupt firmware data.
RAID Controller firmware download has failed.
RAID Controller firmware has been updated.
RAID Controller is back online.
Read config file error.
Rebuild on logical drive *LogicalDrive* has been aborted.
Rebuild or check operations have completed.
Redundant Array State Change: Controller Failed.
Redundant Array State Change: Controllers Back in Redundancy Mode.

TABLE G-34 Error / Status Messages *(Continued)*

Error and Status Messages
Removed a failed primary controller.
Removed a failed secondary controller.
Reselect Timeout (SCSI Channel %d, SCSI ID %d, Target Lun %d). Possible failure of I/O module, cable, controller, or HBA.
Restoring configuration to the controller.
Retry the configuration operation after the update is complete.
SAF-TE/SES card *Channel:Target* firmware has been updated.
SAF-TE/SES card *Channel:Target* global status has been updated.
SAF-TE/SES card *Channel:Target* slot perform status has been updated.
SAF-TE/SES card *Channel:Target* slot status has been updated.
Save a Copy in server.
Saving configuration information; please wait…
Scan SCSI drive (%d.%d) has succeeded.
Scan SCSI Drive information.
Scan SCSI Drive Successful (Ch:%d,Id:%d). Informational message.
Scheduled parity check could not be started on logical drive *LogicalDrive*.
Scheduled parity check has completed on logical drive *LogicalDrive*.
Scheduled parity check has started on logical drive *LogicalDrive*.
Scheduled parity check skipped to next schedule due to incompletion of previous check.
SCSI Aborted Command (Ch:%d,Id:%d). Informational message. Drive may be failing or defective slot.
SCSI Bus Device Reset (SCSI Channel %d, SCSI ID %d, Target Lun %d). Possible failure of I/O module, cable, or HBA.
SCSI Bus Reset (SCSI Channel %d, SCSI ID %d, Target LUN %d). Possible failure of I/O module, cable, or HBA.
SCSI Bus Reset Issued (Ch:%d,Id:%d). Check drive seating, cables, and I/O module. Replace as required.
SCSI Channel Failure - Fibre Loop Connection. Failure Check drive path. Possible cable or module failure.
SCSI Channel Failure - General. Check drive path.
SCSI Channel Failure - Redundant Loop/Path Failure. Check drive path. Possible cable or module failure.
SCSI Channel Failure (Ch:%d,Id:%d). Replace defective I/O or drive module.

TABLE G-34 Error / Status Messages *(Continued)*

Error and Status Messages
SCSI Channel Restored - Fibre Loop Connection Restored. Informational message.
SCSI Channel Restored - Redundant Path Restored. Informational message.
Secondary controller failed!
Server Error.
Server failed the operation due to insufficient memory.
Server Name is empty.
Server Not managed!
Set controller parameter(s) successful.
Set or add configuration failed.
Slot #*Slot* has had a device *Name*.
SMART Predictable Failure Detected (Ch:%d,Id:%d). Informational message. Drive may be failing.
SMTP From address format is wrong or empty.
SMTP From address format is wrong.
SMTP Server address is empty.
Specify how often you want the parity checked.
Standard Configuration options provide a group of basic default RAID sets whereby the drive size, quantity, and assignments are preconfigured.
Standard Configuration will replace the existing configuration.
Standard Host LUN mapping created successfully!
Standard Host LUN mapping deleted successfully!
Standard maps are available to all connected hosts in certain configurations.
Standby rebuild operation completed with an unknown error.
Standby rebuild operation in progress.
Startup state of the secondary controller.
State Change Mutex lock is not released.
Sun StorEdge Configuration Service monitor daemon has started.
Sun StorEdge Configuration Service server daemon has started.
Sun StorEdge Configuration Service startup is complete.
Sun StorEdge Configuration Service trap daemon has started.

TABLE G-34 Error / Status Messages *(Continued)*

Error and Status Messages
System Administrator (ssconfig) has started irrevocable System Shutdown and Restart. SAVE all data and LOG OFF IMMEDIATELY.
System ID is empty.
Tape operation has stopped because an error occurred while reading or writing data, which the drive cannot correct.
TapeAlert notification. Device [*Channel:Target*].
Target HW Error Reported (Ch:%d,Id:%d). Likely poorly seated or defective drive. Possible defective drive slot.
Target Media Error Reported (Ch:%d,Id:%d). Likely poorly seated or defective drive. Possible defective drive slot.
Target Timed-out (Ch:%d,Id:%d). Check drive seating, cables, and I/O module. Replace as required.
Temperature change from *Temperature*C to *Temperature*C.
The background command (s) has finished.
The background command(s) has been aborted.
The changer mechanism is having difficulty communicating with the tape drive. Turn the autoloader off then on and restart the operation. If the problem persists, call the tape drive supplier helpline.
The configuration has been updated.
The configuration was successfully updated. If new LDs/LVs were created, the server may need to be rebooted.
The Controller devices list changed.
The controller parameters have been updated.
The current user is ssconfig; you cannot log in again.
The daemons are not responding.
The device does not belong to the same HBA card. The operations cannot continue.
The drive letter (mounted point) cannot be assigned.
The encrypt key is empty.
The firmware does not support multiple IP assignment mechanisms.
The firmware download failed because you have tried to use the incorrect firmware for this tape drive. Obtain the correct firmware and try again.
The Host LUN filter map (StorEdge SN#%d LD %d Partition %d WWN:) has been created.
The Host LUN filter map (StorEdge SN#%d LD %d Partition %d WWN:) has been deleted.
The IP Address cannot be empty.

TABLE G-34 Error / Status Messages *(Continued)*

Error and Status Messages
The last cleaning cartridge used in the tape drive has worn out. Discard the worn out cleaning cartridge, wait for the current operation to finish, and then use a new cleaning cartridge.
The LD# is moved up after you delete the LD, so it may not be consistent with the LD# shown in the RS-232 terminal window.
The length of the Encrypt Key must be greater than 8 characters.
The Mail Server field cannot be empty.
The media has exceeded its specified life.
The memory allocation Failed.
The mount point (drive letter) cannot be written into file (registry).
The number of logical drives did not increase after creating a logical drive. (before:%d now:%d).
The operation failed because the autoloader door is open. Clear any obstructions from the autoloader door, eject the magazine, and then insert it again. If the fault does not clear, turn the autoloader off and then on again.
The operation failed because the tape in the drive has snapped. Discard the old tape. Restart the operation with a different tape.
The Selected Device list is empty!
The server already exists!
The Server Name cannot be empty or only contain any extra spaces.
The server you selected might have already been shut down.
The set configuration failed because there is another conflicting operation.
The set configuration Failed.
The tape cartridge is not data grade. Any data you backup to the tape is at risk. The drive has not been able to read the MRS stripes. Replace the cartridge with a data-grade tape.
The tape drive has a hardware fault, which is not read / write related. Turn the tape drive off and then on again and restart the operation. If the problem persists, call the tape drive supplier helpline.
The tape drive has a hardware fault. Eject the tape or magazine, reset the drive (hold the unload button down for 5 seconds), and restart the operation.
The tape drive has a problem with the SCSI interface. Check the cables and cable connections and restart the operation.
The tape drive is due for routine cleaning. Wait for the current operation to finish and then use a cleaning cartridge.

TABLE G-34 Error / Status Messages *(Continued)*

Error and Status Messages
The tape drive is having problems reading data. No data has been lost, but there has been a reduction in the capacity of the tape.
The tape drive needs cleaning. If the operation has stopped, eject the tape and clean the drive. If the operation has not stopped, wait for it to finish and then clean the drive.
The tape in the drive is a cleaning cartridge. If you want to backup or restore, insert a data-grade tape.
The tape is damaged or the drive is faulty. The drive can no longer read data from the tape. Call the tape supplier helpline.
The tape is from a faulty batch or the tape drive is faulty. Use a good tape to test the drive. If the problem persists, call the tape drive supplier helpline.
The tape operation failed. Eject and then reinsert the tape or magazine.
The WWN must be a Hex string that is less than 16 characters.
There are no available disks to configure.
There are no LDs / LVs to manage.
There are not enough available disks to add a new LD / LV or there are no available LDs to create a LV. LDs must be unmapped and partitions must be deleted prior to being used in LVs.
There is a map to more than one Host, therefore, the \"Map to Multiple Hosts"\ property cannot be unchecked. Remove the map to multiple hosts before changing this setting.
There is a problem with the autoloader mechanism. Loader mechanism has detected a hardware fault.
There is no spare or replacement drive. Rebuild cannot continue.
This may cause data loss.
This operation can take up to one minute.
This operation might take several seconds. Please wait...
This operation will add to the existing configuration.
This operation will erase any existing configuration and data.
Unable to allocate memory for array inquiry. Unable to monitor this array.
Unable to determine local host, terminating!
Unable to eject cartridge because the tape drive is in use. Wait until the operation is complete before ejecting the cartridge.
Unable to inquire RAID controller.
Unable to inquire SAF-TE device. SAF-TE monitoring for this enclosure disabled.
Unable to inquire tape device. This device will be removed.

TABLE G-34 Error / Status Messages *(Continued)*

Error and Status Messages
Unable to issue Self-Reliability Query on device at [*Channel:Target]*.
Unable to log events.
Unable to open bindings file -or- no bindings present. Check Bindings file.
Unable to open I / O transport layer
Unable to query TapeAlert log data. TapeAlert monitoring disabled for this device.
Unable to read license data.
Unable to read response from SMTP server.
Unable to send e-mail to SMTP server.
Unable to toggle the speaker on the SAF-TE / SES managed enclosure.
Unable to validate recipient at SMTP server.
Unable to write license data.
Undefined Error(Ch:%d,Id:%d). Contact technical support.
Unexpected Disconnect(Ch:%d,Id:%d). Check drive seating, cables, and I / O module. Replace as required.
Unexpected Sense Data Received from Target(Ch:%d,Id:%d). Likely poorly seated or defective drive. Possible defective drive slot.
Unexpected Unit Attention Received from Target(Ch:%d,Id:%d). Likely poorly seated or defective drive. Possible defective drive slot.
UNMAPPED LUN, NOT AVAILABLE TO HOST
Username is empty.
Wait for mutex failed.
Write config file error.
Wrong Fax number format.
Wrong Phone number format.
You must first delete the host mapping for the partitions whose index number is greater before you can change this partition.
You must first delete the host mapping for this LD / LV before you can delete it.
You must first delete the host mapping of the last partition before you can add a new partition.
You must have superuser / administrator privileges to run this program. exiting...

Installation and Program Prompts

TABLE G-35 contains a list of installation and program prompts.

TABLE G-35 Installation and Program Prompts

Installation and Program Prompts
An existing configuration for this package is found. Do you want to restore it?
Are you sure you want to continue?
Are you sure you want to delete the log file?
Are you sure you want to delete the trap?
Are you sure you want to overwrite the file?
Are you sure you want to rebuild the drive?
Are you sure you want to restore factory defaults?
Before starting to use `SUNWsscsConsole`, run `/opt/SUNWsscs/sscsconsole/config_sscon` to input the pathname of the default Web browser to access HTML help files.
Begin downloading firmware to devices. Do you want to continue?
Cannot find the Java Runtime Environment `$JRE_MAJOR.$JRE_MINOR` or above! `SUNWsscs Console` needs JRE 1.2 or above to run. The Console will try to find it in `/usr/java`, `/usr/jre`, `/usr/local/java`, or `/usr/local/jre`. If you installed the JRE in a directory other than one mentioned above, make a link.
Changes made to this setting will NOT take effect until the controller is RESET. Prior to resetting the controller, the operation may not proceed normally. Do you want to RESET controller?
Click View to select one file.
Do you want to download firmware to the controller?
Do you want to download firmware with boot record to the controller?
Do you want to save the current event log file?
Do you want to set up the mail server?
Enter a Contact Name.
Enter a Customer Name.

TABLE G-35 Installation and Program Prompts *(Continued)*

Installation and Program Prompts
Enter a Location.
Enter a mail address.
Enter a System ID.
Enter a valid gateway address.
Enter a valid IP address.
Enter a valid network mask.
Enter SMTP server information.
Enter SMTP Server information.
Enter the login password.
Enter the ssconfig user password to login.
Install JRE 1.2.2, 1.3, or 1.4 before installing the console.
Issue Reset to the controller?
Mapped LUNs exist! These must be deleted before creating new LDs/LVs. If you proceed, this operation overwrites the present configuration. Any existing LDs/LVs are deleted and all data is lost! If you want to keep your present configuration, use the \"Add LDs/LVs to the Current Configuration\" option. Do you want to continue?
Please select a LD/LV!
Please select CH/ID.
Please select the Channel/ID of which you want to scan.
Please specify at least one SSCS agent in command-line or in ssdgrcli.cfg.
Remove the package @PKG_NAME@ and then try to install this package.
Select a LD/LV.
Select a Product ID before downloading firmware.
Select Boot Record File.
Select Configuration File.
Select either AM or PM.
Select Firmware File.
Select only ONE LD/LV!
Select only one row to edit it.

TABLE G-35 Installation and Program Prompts *(Continued)*

Installation and Program Prompts
Select only one row to remove it.
Select Server for Managing Controller.
Select the agent before clicking Remove.
Select the agent item before clicking Edit.
Select the Channel/ID of the drive you want to scan
Select the firmware file before downloading it
Select the Logical Drive(s)
Select the server item before clicking Edit.
Select the server item before clicking Remove.
Select the Starting Day.
Select Timeout(Ch:%d,Id:%d). Likely poorly seated or defective drive. If random drives, possible I/O module or cable failure.
Specify Map Information.
`SUNWsscsConsole` needs JRE 1.2.2, 1.3, or 1.4 to run. The Console will try to find it in `/usr/java`, `/usr/jre`, `/usr/local/java`, or `/usr/local/jre`. If you installed the JRE in a directory other than one mentioned above, make a link.
The client receives events only when it is running. Are you sure you want to exit?
The Content of Periodic Trap cannot be \“Event\”. Please select another one.
The controller needs to be reset for the new firmware to take effect. Do you want to reset the controller?
The encrypt key you entered includes extra space in the beginning or at the end, which can cause encryption errors. Do you want to continue?
This may cause data loss. Are you sure you want to move?
This operation overwrites the present configuration. Any existing LDs/LVs are deleted and all data is lost! If you want to keep your present configuration, use the \“Add LDs/LVs to the Current Configuration\” option. Do you want to continue?
This operation overwrites the present configuration. Any existing LDs/LVs are deleted and all data is lost! If you want to keep your present configuration, use the \“Add LDs/LVs to the Current Configuration”\ option. Do you want to continue?

TABLE G-35 Installation and Program Prompts *(Continued)*

Installation and Program Prompts
This operation will result in the loss of current controller settings and data on ALL of the logical drives. Are you sure you want to restore factory defaults?
This operation will result in the loss of data on ALL of the modified partitions. Do you want to continue?
To find out the java version currently installed, type “java-version”
Trap information has been modified. Do you want to save it?
You selected “Event” as the Trap Type, therefore, you must select at lease one Active trap event.
You selected “My SMTP server needs authorization,” therefore, you must enter a Password.
You selected “My SMTP server needs authorization,” therefore, you must enter a Username.
You selected “use encrypt,” therefore, you must enter an encrypt key.

Glossary

This appendix lists acronyms and defines RAID terms found throughout the documentation. It also includes definitions of the operational states for disk drives, logical drives, and redundant controllers.

Acronyms

ANSI American National Standards Institute.

CH Channel.

CISPR International Special Committee on Radio Interference.

EMU Event Monitoring Unit.

FC-AL Fibre Channel-Arbitrated Loop. FC-AL is implemented as either a loop or a fabric. A loop can contain up to 126 nodes, accessible through only one or two servers.

FRU Field-replaceable unit.

GB Gigabyte. 1,000,000,000 (one billion) bytes.

GBIC Gigabit Interface Converter. A hot-swappable input/output device that plugs into a Gigabit Ethernet port or Fibre Channel.

HBA Host bus adapter.

ID Identifier number.

IEC International Electrotechnical Commission.

JBOD Just a bunch of disks (an array unit with drives and no controllers).

LAN Local area network.

LD Logical drive.

LUN Logical unit number. A unique identifier used on a SCSI channel that enables a host to differentiate between separate devices.

LVD A low-noise, low-power, and low-amplitude signaling system that enables data communication between a supported server and storage devices. LVD signaling uses two wires to drive one signal over copper wire and requires a cable that is no longer than 25 meters (82 feet).

MB Megabyte. 1,000,000 bytes or characters of data.

NVRAM Non-volatile random access memory. A memory unit equipped with a battery so that the data stays intact even after the main power had been switched off.

PID Primary controller identifier number.

RAID Redundant array of independent disks. A configuration in which multiple drives are combined into a single virtual drive to improve performance and reliability.

SAN Storage area networking. A high-speed, open-standard scalable network of storage devices and servers providing accelerated data access.

SCSI Small computer systems interface. An industry standard for connecting disk and tape devices to a workstation.

SES SCSI enclosure services driver. An interface to SCSI Enclosure Services devices. These devices sense and monitor the physical conditions within an enclosure, as well as enable access to the status reporting and configuration features of the enclosure (such as indicator LEDs on the enclosure).

SID Secondary controller identifier number.

S.M.A.R.T. Self monitoring analysis and reporting technology. The industry standard reliability prediction indicator for both the IDE/ATA and SCSI hard disk drives. Hard disk drives with SMART offer early warning of some hard disk failures so critical data can be protected.

SMTP Simple mail transfer protocol. A protocol for sending email messages between servers and from mail clients to mail servers. The messages can then be retrieved with an email client using either POP or IMAP.

SNMP Simple network management protocol. A set of protocols for managing complex networks. SNMP works by sending messages, called protocol data units (PDUs), to different parts of a network. SNMP-compliant devices, called agents, store data about themselves in Management Information Bases (MIBs) and return this data to the SNMP requesters.

WWN Worldwide name. A number used to identify array volumes in both the array system and systems using the Solaris operating environment.

Terminology

active–active controllers A pair of components, such as storage controllers in a failure tolerant storage system that share a task or set of tasks when both are functioning normally. When one component of the pair fails, the other takes the entire load. Dual active controllers (also called dual-active controllers) are connected to the same set of devices and provide a combination of higher I/O performance and greater failure tolerance than a single controller.

automatic rebuild A process where data is automatically reconstructed after a drive failure and written to a standby (spare) drive. An automatic rebuild also occurs when a new drive is installed manually in place of a failed drive. If the rebuild process is interrupted by a reset, use the Array Administration → Rebuild to restart the rebuilding process.

background rate The background rate is the percentage of available array controller CPU time assigned to array administration activities, such as rebuilding failed drives, checking parity, and initialization. If the background rate is set to 100%, the array administration activities have a higher priority than any other system activity. At 0%, the array administration activity is done only if there is no other activity on the array controller.

caching Allows data to be stored in a pre-designated area of a disk or RAM (random access memory). Caching is used to speed up the operation of RAID systems, disk drives, computers and servers, or other peripheral devices.

channel Any path used for the transfer of data and control information between storage devices and a storage controller or I/O adapter. Also refers to one SCSI bus on a disk array controller. Each disk array controller provides at least one channel.

fabric Fibre Channel network built around one or more switches.

fabric switch A fabric switch functions as a routing engine, which actively directs data transfer from source to destination and arbitrates every connection. Bandwidth per node through a fabric switch remains constant when more nodes are added, and a node on a switch port uses an up-to-100 Mbps data path to send or receive data.

failover A mode of operation for failure tolerant systems in which a component has failed and its function has been assumed by a redundant component.

fault tolerance The capacity to cope with internal hardware problems without interrupting data availability, often by using backup systems brought online when a failure is detected. Many storage systems provide fault tolerance by using RAID architecture to give protection against loss of data when a single disk drive fails. Using RAID 1 (mirroring), RAID 3 or 5 (striping with parity), or RAID 6 or 1+0 (mirroring and striping) techniques, the array controller can reconstruct data from a failed drive and write it to a standby or replacement drive.

fault-tolerant logical drive A logical drive that provides protection of data in the event of a single drive failure by employing RAID 1, 3, 5, or 6 (also known as RAID 1+0).

Fibre Channel A cost-effective gigabit communications link deployed across a wide range of hardware.

groups A group is a new data object that enables multiple servers to be contained under a single category, are similar in concept to domains, and enable you to organize servers within Configuration Service. Instead of a linear tree of all the managed servers, the Configuration Service operator can organize the servers into like sets or groups.

Groups are not required. You can configure Configuration Service for no groups and fifteen servers, for example, or for one group with ten servers underneath, with an additional five at the top level. Configuration Service enables any combination.

The number of groups permitted and the number of servers within a group is limited only by available system memory. If a server is a member of a group and a user deletes that group from the group list box, Configuration Service reassigns the servers in that group to the no group category. Configuration Service automatically remaps the tree in the main window.

hot spare A drive in a RAID 1 or RAID 5 configuration that contains no data and acts as a standby in case another drive fails.

hot-swappable The ability of a field-replaceable unit (FRU) to be removed and replaced while the system remains powered on and operational.

logical drive An array of independent physical drives that appears to the host as one large drive.

LUN mapping The ability to change the virtual LUN as presented to the server from storage. This enables such benefits as the ability of a server to boot from the SAN without requiring of a local disk drive. Each server requires LUN 0 to boot.

LUN masking The characteristic that enables an administrator to dynamically map an HBA to a specified LUN. This provides an individual server or multiple servers access to an individual drive or to multiple drives, and prohibits unwanted server access to the same drives.

mirroring (RAID 1) Data written to one disk drive is simultaneously written to another disk drive. If one disk fails, the other disk can be used to run the system and reconstruct the failed disk. The primary advantage of disk mirroring is 100% data redundancy. Since the disk is mirrored, it does not matter if one of the disks fails. Both disks contain the same data at all times and either can act as the operational disk.

Disk mirroring provides 100% redundancy, but is expensive because each drive in the system is duplicated.

N port A Fibre Channel port in a point-to-point or Fabric connection.

out-of-band Refers to the connections and devices that are not in the data path.

parity check A process whereby the integrity of the redundant data on fault tolerant arrays (RAID 1, 3, 5, and 6 or 1+0) is checked. The parity checking procedure on a logical drive recalculates the parity of data stripes in each of the logical drive's RAID stripe sets and compares it with the stored parity. If a discrepancy is found, an error is reported and the new correct parity is substituted for the stored parity.

partition A section of disk storage space, also referred to as a System Drive or LUN, that is presented to the host operating environment as a single physical drive. A logical drive can be located on one or more physical drives.

partner group A pair of interconnected controller units. Expansion units interconnected to the pair of controller units can also be part of the partner group.

physical array A physical array is a group of physical drives in Configuration Service that participate in one or more logical drives. If a group of physical drives is configured into a logical drive without using the entire capacity of the physical drives, Configuration Service requires that the same physical array of drives be used together in any remaining logical drives that are created with the remaining capacity.

In the New Configuration window, the Add Disk button changes to Add Array when the remaining drive capacity is on multiple physical drives that have already been used to create a logical drive. Now that the physical drives have been sliced, they have to be selected as an array. They cannot be selected separately.

RAID Redundant Array of Independent Disks. An arrangement of two or more disk drives configured to work together to provide more disk storage space, better performance, and/or redundant backup of data. Various combinations of these features are described by defined RAID levels. For a detailed description of RAID levels, see "RAID Basics" on page 195.

read policy Descriptions of the read policies are as follows:

When you indicate a No Cache read policy, the controller does not store data in the read cache.

Normal specifies that the current controller does not use Read ahead caching for the current drive.

Set the read policy to Read Ahead and the controller reads multiple adjacent blocks of data automatically. This is most effective for applications with sequential reads.

rebuild Rebuilding a disk is the process of reconstructing the data on a disk before it failed. Rebuilding can be done only in arrays with data redundancy.

See “automatic rebuild” on page 289 for detailed information about rebuilding. For the Rebuild rate, see “background rate” on page 289.

spanning Disk spanning makes use of the firmware’s striping capability to stripe data across two otherwise independent RAID logical drives. The two spanned logical drives are presented to the operating environment as one logical drive. The advantages of spanning are:

Supports two simultaneous drive failures in the combined fault tolerant logical drives (provided there is one drive failure from each logical drive).

Improves performance because the number of spindles is increased.

The disadvantage of spanning is that the RAID overhead for redundant RAID levels is increased since each logical drive handles fault tolerance separately.

standby drive A drive that is marked as a spare to support automatic data rebuilding after a physical drive associated with a logical drive fails. For a standby drive to take the place of another drive, it must be at least equal in size to the failed drive. Also, the failed drive itself must be from a RAID 1, 3, 5, or 1+0.

state The current operational status of a disk drive, a logical drive, or redundant controllers. The storage system stores the states of drives, logical drives, and redundant controllers in its nonvolatile memory. This information is retained across system power interruptions.

stripe size This is the amount of data in kilobytes that is striped across each physical drive in a logical drive. The values are in increments of 8 kilobytes and range from 8 to 64 kilobytes. Generally, large stripe sizes are more effective for systems with primarily sequential reads.

To change the stripe size on an existing drive, you need to back up your data, redefine the stripe size, reconfigure the storage, and restore all the data.

striping The storing of sequential blocks of incoming data on all the different SCSI drives in a logical drive. For example, if there are three SCSI drives in a logical drive, data is stored as follows:

block 1 on SCSI drive 1

block 2 on SCSI drive 2

block 3 on SCSI drive 3

block 4 on SCSI drive 1

block 5 on SCSI drive 2, etc.

This method of writing data increases the disk system throughput because multiple drives are working simultaneously, retrieving and storing. RAID 0, 3, 5, 1+ 0 all use striping.

terminator A part used to end a SCSI bus. Terminators prevent energy from reflecting back into a cable plant by absorbing the radio frequency signals.

volume Also called a logical unit number or LUN, a volume is one or more drives that can be grouped into a unit for data storage.

write-back cache A cache-writing strategy in which the array controller receives the data to be written to disk, stores it in the memory buffer, and immediately sends the host operating environment a signal that the write operation is complete, without waiting until the data is actually written to the disk drive. Within a short time, the controller, when not busy, writes the data to the disk drive.

Write-back caching improves the performance of write operations and the throughput of the controller card. However, because there is a danger of data loss in the case of a power failure, storage systems with write-back caching are equipped with a UPS or battery backup cache. A UPS provides power long enough to enable any data in the cache memory to be written to the disk drive. With battery backup cache, the battery provides power to retain the memory data for up to 48 hours.

write policy A cache-writing strategy used to control system write operations. The write policy options are write-back and write-through cache.

write-through cache A cache-writing strategy in which the array controller writes the data to the disk drive before signaling the host operating environment that the process is complete. Write-through cache has lower write operation and throughput performance than write-back cache, but it is the safer strategy, with minimum risk of data loss on power failure.

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